Mount Allison University
Environmental Audit-2000

Preface

Two years have passed since the first Environmental Audit was conducted at Mount Allison. In this time, there have been important changes both on the Mount Allison campus and in the outside world. On campus, the steps that have been taken since 1998 include the use of energy and water efficient fixtures, the decision to use paper-saving digital copier machines, increased environmental course offerings and the passing of a university Environmental Policy in May of 1999. But while gradual progress has been made on the Mount Allison campus, global environmental destruction continues at an unrelenting pace. The improvements we have made do not come close to compensating for our environmental impact. As Lester Brown notes in *State of the World 2000*, "As the global economy expands, local ecosystems are collapsing at an accelerating pace."[1] Many environmental problems, such as global warming, cannot be easily detected in the short term. Nevertheless, problems such as the greenhouse effect, the destruction of forested land, acid rain, overflowing landfill sites, the degeneration of our water ways, the loss of biodiversity and desertification are pressing environmental concerns that need to be addressed in the near future. Bill McKibben says in his book, "The End of Nature" "There is no time to just decide we'll raise enlightened children and they'll slowly change the world...*Most* people have to be persuaded, and persuaded quickly, to change."[2] These issues are in need of drastic action on the part of individuals and institutions.

Institutions represent a large number of people and they are therefore an important catalyst for change. Universities, in addition to having the power associated with being large institutions, bring together young people and those who have education and expertise. As such, universities both produce future leaders and influence a society's current situation. Universities thus have an obligation to provide leadership. Given the urgency of environmental problems, environmental leadership is particularly important. This audit seeks to assess the environmental conditions at Mount Allison and to determine the progress that has been made since the first audit was conducted in 1998. This audit is only a tool; in reporting the current environmental standing of the university it is hoped that this document can support environmental endeavours on this campus and elsewhere. This report will only become valuable when translated into concrete action.

Executive Summary

Since the first audit was conducted in 1998, there has been a growing recognition on campus of the need for environmental responsibility. However, while progress is being made there is still much to be done in terms of ingraining environmental concern in the university's operations. This tension between a desire for improvement and the need for accelerated change is reflected in each of the areas studied in the report.

A letter grade has been assigned to each chapter according to the progress and overall environmental performance in that area, specifically with respect to the environmental policy performance indicators. The grades, on a scale from A to F, are reflect the effort towards, and the performance in, reducing environmental impact in each area of study. The following legend defines the standards upon which each grade was assigned:

[1] Brown, Lester "Challenges of the New Century" State of the World 2000 p.4

[2] McKibben, Bill The End of Nature, New York: Doubleday 1989, p. 204

Grade	Standard
A	All aspects of the environmental policy are adhered to and exceeded; Substantial effort is made to improve environmental practice and to incorporate environmental concerns into decision-making
B	Significant effort has been made both to improve environmental practice and to incorporate environmental concerns into decision-making.
C	Steps have been taken to improve environmental practice and consideration is given to environmental concerns in decision-making
D	Environmental practice has not changed.
F	Environmental practice has worsened.

These grades appear in the executive summaries and at the end of each chapter in the report.

Buildings

There are a total of 43 buildings on campus. In the two years since the last audit was conducted, there have been a number of notable changes to campus buildings, including some significant renovations and repairs, as well as demolitions. In keeping with the policy, when renovating and repairing existing buildings and when constructing new ones, the university now aims, wherever possible, to make use of environmentally-friendly technology. For example, the new Dunn Building(formerly the PEG) uses triple layered insulation, recycled paint on the interior walls, and Wattstopper technology in the bathrooms. In addition, much of the waste from the renovation was recycled. It is recommended that the university, prior to approval of renovations or construction on any existing or future structures on campus, require that an environmental impact analysis be completed and presented to Senior Administration and the Director of Facilities Management, as per the policy. This analysis would consider the type and efficiency of materials used, the damage to local flora and fauna, the energy efficiency of the design and its ability to maximize renewable environmental resources.

Grade Assigned: C

Energy

Between June 1, 1998 and May 31, 1999, 11 754 265.7 kilowatt hours of electricity were consumed at Mount Allison. These totals show a 1 620 936.7 kilowatt hour increase in annual consumption compared to 1997-1998 totals. The university's oil consumption has decreased since 1998 by approximately 255 012 litres in 1998-1999 fiscal year and 430 628 litres in 1999-2000. The reduced heating oil consumption is primarily due to milder winters. Facilities Management has made conscious efforts to improve the efficiency of the energy consuming systems on campus. Projects such as making the central heating system leak free and the use of more sophisticated thermometers to control the temperature have been undertaken these past years. It is recommended that all members of the university community take steps to decrease their energy consumption. It is also recommended that the university's administration seriously consider the use of wind, solar and geothermal energy sources wherever possible, in order to achieve the holistic approach to energy use laid out in the policy.

Grade Assigned: C

Transportation

The university fleet has increased by one vehicle since 1998. The amount of use these vehicles get has not changed significantly in the last two years. There has been one bike rack installed since the last audit and there are plans to install another this year. In terms of individual transportation, the breakdown of people who walk, cycle, or drive to work is virtually unchanged since 1998. It is recommended that the university explore alternative means of transportating goods on campus (foot, bike trailers) and that "green" vehicles are purchased when replacing vehicles in the fleet.

Grade Assigned: D

Air Quality

Between 1997 and 1998, an estimated 13 312 290.89 kg of greenhouse gases were emitted through electricity consumption and combustion of fossil fuels to heat the campus[3]. Between 1998 and 1999, this amount decreased to approximately 13 105 480.1 kg of emissions. The significant drop in the amount of emissions can be attributed to the relatively milder winters that the area has been experiencing in the past two years (heating oil consumption almost halved during this period). This is a significant improvement in Mount Allison's emission levels attributed to the use of electricity and heating oil. However, the use of vehicles on campus and their related emissions has increased. This is because vehicle use has remained constant while the number of vehicles has increased. The university does not currently have a section in the policy specific to air quality. Air quality is addressed as an energy issue. It is recommended that the university adopt a policy that will commit the institution to an emissions reduction program that would meet or exceed Canada's Kyoto Protocol commitment. Such a program would begin by installing the measuring devices needed to establish a baseline for university emissions.

Grade Assigned: D

Hazardous Materials

Because the sources and volume of hazardous materials being used in an intricate system such as a university are often hard to track, no comparison with the 1998 audit on the amount of hazardous waste can be made. The first performance indicator for this section of the policy is thus not being met. There does not appear to be any important increase or decrease in the amount of hazardous materials used and disposed of in the various departments examined in this chapter. The university continues to dispose of these materials according to the appropriate regulations. It is recommended that the university make funds available for the use of alternatives to chemical herbicides/insecticides in the area of turf maintenance; the purchasing of cleaning materials be based on environmental indicators beyond that of human health; the university make funds available for a silver recovery program in the fine arts department; the university establish a means of monitoring the purchase, use, and disposal of all hazardous materials on campus.

Grade Assigned: D

[3] This amount of gases differs from the amount noted in the 1998 audit because the methods of calculation were not the same. The 2000 audit method of calculation was used for both years for comparative purposes.

Solid Waste

Since the time of the last audit, little effort has been made to minimize the amount of solid waste produced by the universty. Between September 1998 and September 1999, Mount Allison sent approximately 305.7 tonnes of garbage to landfill. This shows a significant increase from the previous year, when 224-269 tonnes were sent[4]. Unfortunately, the university does not have an accurate means of measuring the volume of waste, and these figures are estimates at best. The recycling program has not changed since 1998 and participation is still limited, thus failing to meet the performance indicator on recycling. A random sample of a day's worth of garbage showed that approximately 50 percent of garbage consists of materials that can be recycled in the current program. Efforts are currently being made to improve recycling on campus by increasing the amount of recycling bins and creating better signage to accompany these bins. It is imperative that all members of the university strive to minimize the amount of waste produced in their daily lives. It is recommended that the university make funds available for the purchase of a scale with which to measure the volume of solid waste before it leaves the campus, and that the Wet Dry Solid Waste program be implemented on campus within a one year period.

Grade Assigned: D

Paper

Mount Allison's paper consumption has increased since the 1998 audit, which reported that 4 498 218 sheets of paper were consumed between 1997 and 1998. The total paper consumed in 1998-1999 was approximately 6 450 000 sheets. This increase is due to the inclusion of specialty paper in this year's total, as well as increased business at Reprographics. Some progress has been made in reducing paper wastage on campus. The library has recently switched to an electronic notice system for overdue books. The new contract for printers and photocopiers will result in further savings due to the fact that double siding will be a default setting. In keeping with the performance indicator contained in the Purchasing section of the policy, recycled paper is purchased and made available to the university community, though the recycled and post-consumer content remains relatively low. It is recommended that the university include a section on paper in the Environmental Policy and that it make recycled paper more widely available to various academic and administrative departments.

Grade Assigned: C

Food

In 1999-2000, the Mount Allison community consumed approximately 10 205.77 kilograms per week of food and beverages. The addition of beverages in year's total makes it higher than that reported in the last audit. However, the consolidation of two meals halls into one has reduced wastage overall. It is recommended that Sodex'ho Alliance offer an organic options for at least one meal per week and that this be implemented in the near future. It should be noted that the organization of the Food chapter differs from the last audit and from the policy. Details on solid waste, cleaning products, and packaging at Sodex'ho Alliance are addressed in the Solid Waste and Hazardous Materials chapters in this year's report.

Grade Assigned: C

Water

In 1999 Mount Allison was billed for 178 382 000 litres of water. Due to a change in the metering and billing system since the time of the last audit, it is

[4]There is a discrepancy between the volume of garbage listed in the 1998 audit which states 224 tonnes, and the figures contained in a report produced by the Grounds Manager in April 1998 which states 269.87 tonnes.

difficult to make any comparison between the two volumes reported. In keeping with the performance indicator for this section, efforts have been made to reduce water consumption on campus, including the repair of water leaks in the heating system and the retrofitting of fixtures with more efficient ones. It is recommended that alternatives that further reduce water usage or eliminate it altogether (e.g. composting toilets) be investigated.

Grade Assigned: C

Finances

There has been virtually no change in the environmental practice or performance in the university's finances, although the level of awareness about the need to include environmental concern in this area of operation has perhaps increased. Mount Allison does not yet have an environmental purchasing policy, although some efforts are made to include environmental concerns when spending money from the university budget. A contract was signed with Canon to lease photocopiers and printers with double-sided as the default option. In addition, recycled paper is now available at the bookstore. None of the university's investments are ethically screened. It is recommended that the university pass an environmental purchasing policy in order to ensure that the stipulations contain in the Environmental Policy govern purchasing in the future. It is recommended that the university make the current investments portfolios available to the public. It is also recommended that an ethical fund be established for the pension plan.

Grade Assigned: D

Education

The state of environmental education at Mount Allison has advanced significantly since 1998. The Environmental Science major was improved and reintroduced. The Environmental Studies program now offers both major and minor. A director's position was created to oversee the program and ensure its development. Much has been done to raise the profile of the Environmental Policy, passed in May, 1999. However, many members of the university community remain uninformed about the efforts being made to make Mount Allison a leader in environmental conduct. It is recommended then, that a mandatory first year course be created to ensure that all students graduate having completed at least one course in environmental issues. In keeping with the performance indicators for this section of the policy, a Green Certificate should also be established to acknowledge those students who have completed a number of courses with environmental content.

Grade Assigned: B

Acknowledgements

Mount Allison University's second Environmental Audit report was made possible through the help and advice of numerous people:

The Environmental Issues Committee for ensuring that the audit process begun in 1998 was continued. Jeff Lamb for his advice on just about everything. Perry Eldridge for continuing to serve as the man behind the machine that is Mount Allison. Sarah O'Keefe, Hillary Lindsay, and Yuill Herbert for recalling long-forgotten details of the last audit.

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Purpose of the Audit

This report is the second biannual environmental audit of Mount Allison University. The first audit was conducted in the summer of 1998 by two students, Hillary Lindsay and Sarah O'Keefe. The purpose of that audit was fourfold:

1) To account for the resources which flow through Mount Allison University.

2) To compile comprehensive environmental data from the various sectors of the university community.

3) To educate the administration, students, staff, faculty and community.

4) To initiate changes leading to a more environmentally sustainable campus.

Under the direction of the Environmental Issues Committee, three students, Jacques Breau, Kate Kennedy, and Anna Kirkpatrick, were hired to conduct the second audit during the summer of 2000. The second report is intended to act not only as a comprehensive update of Mount Allison's environmental accountability since the 1998 report, but also as an assessment of the performance indicators of each article in the university's Environmental Policy. The policy was created as a means of ensuring that the various levels of responsibility in the university community continue to work towards making Mount Allison a leader in environmental performance. Subsections within each chapter of this report identify the performance indicators pertaining to that area of concern, and gauge the extent to which those indicators are being met. In some cases, the performance indicators of the current policy were found by the auditors to be ineffective measures of progress or were not fully researched. In these cases, changes have been suggested. Wherever possible, this year's auditors have tried to expand the scope of the research done in each chapter in order to provide the most comprehensive view of the university's actions as possible.

Environmental Action on Campus

Since 1998, environmental action on the Mount Allison campus has been centred primarily on the Environmental Policy and a number of campaigns by the Blue-Green Society, the leading environmental group on campus. The goal of these projects has been to raise the level of environmental literacy while actively minimizing environmental impact.

The Environmental Policy concept emerged prior to the last audit and was developed by the Environmental Issues Committee. In May, 1999 the policy was passed by the Board of Regents. It contains a general policy and a set of performance indicators in each of the nine areas: Curriculum, Energy, Hazardous Materials, Transportation,Water Consumption, Solid Waste, Food, Purchasing and Buildings. The policy does not contain time frames or regulatory mechanisms, but instead focuses on achievable goals that can be used as a measure of progress in each area. It states that these goals are to be fulfilled "on an ongoing basis as resources become available and technology improves". In September 1999, the Blue-Green Society and the Orientation Committee created "Green Orientation" to inform incoming students of the policy and to encourage them to adopt environmentally friendly living habits, such as recycling and reducing consumption of water, energy, and paper. Reusable mugs were given to each student and china used at the outdoor barbecue. Two students gave a presentation on the policy and its dependence on individual commitment at one of the evening events during the week. In the spring of this year, three students were hired as "Green Ambassadors". Their job was to raise the profile of the policy amongst staff and students through formal and informal presentations around campus, and to gain a general impression of how the policy has been received by members of the university community.

The Blue-Green Society's work since the last audit has been focussed on various campus greening projects, the provincial Protected Areas Strategy campaign, and raising awareness about the World Trade Organization. The campus greening group has worked to install paper recycling bins in all residences, improving the level of recycling and reuse of paper in the library.

The Protected Areas Strategy was built around the report drafted by Dr. Louis LaPierre to designate up to twelve protected areas in the province. Public consultation formed a significant part of the process, allowing members of the Blue Green Society to voice their opinions on the importance of selecting large and diverse areas of land for protection. Students also coordinated fly-overs of the province to show MLAs, media and other interested individuals the extent of logging and mining in the region. Since then, a multi-stakeholder committee has created a report which proposes eight of the twelve areas be protected. It is expected that this will be approved by the provincial government by the end of the summer.

The students working to raise awareness about the World Trade Organization (WTO) in the fall of 1999 created a series of informative posters, a question and answer session, and a booth at the Student Centre where information on the organization and its past disregard for environmental, social, and cultural concerns was given, and students were invited to sign a banner that read "MTA Students Say No to the WTO". This banner was taken to the third ministerial meeting of the WTO in Seattle Washington by four students who protested the organization in November, 1999.

Efforts to minimize environmental impact on this campus have not been limited to the Blue-Green Society. In March 2000, the Amnesty International group at Mount Allison hosted the third annual Amnesty International Human Rights Festival. In all of their communications, recycled paper and envelopes were used. Even more impressive was the group's effort to ensure that almost all food provided at the conference came from organic or local sources. Many foods were ordered in bulk through Jacob's Larder or from organic farms in the area.

Environmental action at Mount Allison has traditionally been limited to grassroots or individual initiatives. Though the push for stronger environmental accountability in the university is still very much driven by these groups, the recognition that environmental concerns must be part of the daily operation of this institution has certainly increased in the last few years since the concepts of environmental auditing and policy-making were first introduced on campus.

Organization of the Audit Chapters

The organization of this report is essentially identical to that of the 1998 audit in terms of the division of chapters and the subsections contained within, with a few changes: A subsection entitled **Overview of Performance Indicators** has been added for the purpose of evaluating the current environmental policy, the progress made since it was passed, and changes to these indicators that could potentially improve the effectiveness of the policy. The presentation of information in each **Audit** subsection has been adapted from the last report only where it was felt that the clarity could be improved upon. Any fundamental changes to the methodology or information contained in specific areas of research is indicated at the beginning of that chapter. The chapters are organized as follows:

The **Introduction** gives a brief synopsis of the major improvements (or lack thereof) since 1998, including the total use or disposal of particular materials as a means of gauging the basic impact of the university in each area of resource flow.

Environmental Significance provides information on the current supply or scarcity of a resource, and the impact of human use of this resource on the local and global environment. Although many of these subsections have changed little since the last report, significant changes to policy or breakthroughs in

human understanding of the various issues since 1998 have been included.

Current Environmental Policy quotes the section of the Environmental Policy that pertains to that chapter.

Responsible Parties identifies the organization and personnel responsible for the management of a particular resource on the Mount Allison campus. In a few cases, these parties are explained more fully in this report.

The **Audit** subsection comprises the bulk of each chapter and addresses the current state of the environmental resource and its use at Mount Allison. In a few chapters, this subsection has been significantly altered from the last report in terms of the type or extent of data collected. This is indicated at the beginning of this subsection within each chapter. This year, the food chapter deals exclusively with food; details of the cleaning products and solid waste associated with Sodex'ho are included in the hazardous waste and solid waste chapters.

Case Studies provide examples of environmentally responsible actions taken by other universities or institutions to manage a particular resource. Wherever possible regional or Canadian examples were selected.

Recommendations outline the concrete actions that can be taken by various members of the university community. Many recommendations have been taken from the last report simply because no action was taken by the respective parties. Recommendations that, upon further research, proved ineffective, have been amended or omitted. In addition, a number of new recommendations were made based on the current management of each resource. In each chapter, recommendations are made for:

Senior Administration
Staff
Faculty
Students

Review of Current Environmental Policy is presented as a chart in each chapter. It is designed to provide a quick synopsis of the performance indicators that accompany each section of the current Environmental Policy, the progress made in each of these areas, and changes that might make these indicators more accurate measures of progress. In many cases the auditors found the performance indicators themselves to be satisfactory and no change is proposed.

Letter Grades are explained in the Executive Summary of the report. They are designed to give the briefest possible synopsis of the university's performance in each of the areas studied by the auditors. They appear at the end of each chapter.

N.B. All direct references made in the text are footnoted and a complete bibliography of sources used for the report is contained after the last chapter. As much as possible, data collected for the audit was integrated into the text of the report. In instances where extensive data was collected, a note of it is made in the text with directions to an appendix. All appendices are located at the end of the report.

Buildings

Introduction

There are a total of 43 buildings on campus. In the two years since the last audit was conducted, there have been a number of notable changes to campus buildings. Over this period, two buildings, French House and 16 Rectory Lane, have been demolished. Significant renovations and repairs have been performed on the heating plant, Barclay building, Centennial Hall, the Athletic Centre, Hart Hall, the Tantramarsh Club, Bigelow House, the CLT, Jennings and the PEG. When renovating and repairing existing buildings, and when constructing new ones, the university aims, wherever possible, to make use of environmentally-friendly technology. For example, the new Dunn Building(formerly the PEG) uses triple layered insulation, recycled paint on the interior walls, and Wattstopper technology in the bathrooms. In addition, much of the waste from the renovation was recycled.

Environmental Significance

On a global scale, human-built structures have a major impact on the natural environment. Buildings have the potential to influence the environment in a number of ways. The materials from which they are constructed as well as their overall design contribute to a building's environmental impact. Materials used in building construction are one source of risk to the environment. Use of some materials, such as tropical woods, results in the depletion of scarce resources. Other materials, such as asbestos and lead have the potential to contaminate the areas where they are found. The way a building is constructed also has the potential to influence the environment. Poorly designed buildings that do not take environmental concerns into consideration (that, for example, do not make provisions for recycling facilities) and are not built to last can result in unnecessary environmental damage. Buildings designed to be long-lasting will ultimately be better for the environment and more cost-efficient than those which must be replaced after a relatively short time. Thus, more sustainable buildings are those made from environmentally sound materials and designed to last.

While buildings have an undeniable impact on the natural environment, there are a number of steps that can be taken to improve a building's environmental standing. These include using products such as recycled bricks, "lumber"made from recycled plastic, and recycled or low-toxicity paint. Design features such as positioning buildings to take advantage of passive solar heating, using energy efficient lighting and heating systems and providing adequate insulation will also help to minimize environmental impact. The environmental impact of some building materials can be found in figure 4.1.

Figure 4.1-Environmental Impact of Common Building Materials

Substance	Found In	Environmental Impacts
Asbestos	Concrete Additive, Plaster, Insulation, Panels and Decking, Ceiling and Wall tiles, Siding	Mutagen
Poly Chlorinated Biphenyls (PCBs)	Transformer Oil Capacitors in Fluorescent lights	Acts as an endocrine imitator causing numerous genetic defects including cancer.
Chlorofluorocarbon (CFCs)	Air Conditioners, Refrigerator coolant (Freon)	Ozone Depletor, Greenhouse Gas
Lead	Solder, Old Piping and paints	Poison; causes organism damage and death
Petroleum Products	Storage Tanks	
Mercury	HVAC controls	Diminishes oxygen and biodiversity
Tropical Wood	Plywood, Siding, Wall frames	Destruction of rainforests
Asphalt/ Tar	Roofing	Irritant, possible carcinogen

Current Environmental Policy

"The University will endeavour, under the supervision of Facilities Management, to minimize the ecological impact of the construction, maintenance and operation of the buildings on campus."

The performance indicators for this section are as follows:

- "Response time for building maintenance and repairs is monitored and minimized. Neglected maintenance tasks generally increase energy use and potential harm to the environment.
- Prior to new building projects, an environmental impact analysis is completed and such impact is minimized through appropriate selection of materials or design elements.

- Building construction or renovation makes use of environmentally friendly materials and disposal procedures."(Section 2.9, Mount Allison University Environmental Policy, www.mta.ca/environment/)

Responsible Parties

The maintenance and repair of campus buildings is the responsibility of the Facilities Management department. The mandate of this department is to "provide students, employees and the university community with a safe, clean and comfortable environment which supports the educational, residential and extracurricular goals of the university, while acting in a financially responsible fashion." (Facilities Management Mission Statement) This work is carried out by 5 carpenters, 2 plumbers, 1 electrician, 4 stationary engineers, 1HVAC technician and assistant, 2 utility workers and 43 custodians (there are also a number of casual custodians). The activities of these staff members are overseen by the Director, the Technical Services Manager, the Custodial Senior Supervisor, the Trades Supervisor and the Project Manager. The need for repairs, renovations, or construction of new buildings is reported to the director. When there are sufficient funds available, the director requests design proposals from architects. The contract is then awarded to the lowest bidder.

Audit

During the 1999-2000 academic year, Facilities Management spent approximately $2 436 465 on minor repairs and major renovations to campus buildings. In 1998-1999, approximately $2 416 080 was spent on repairs and renovations. Full details of projects undertaken since 1998 are included in Appendix A. A number of projects were listed in the 1998 audit as awaiting funding. Of these, renovations on the PEG and the changeover from the McConnell meal hall to the new Jennings meal hall have been completed.

In the past two years, the university has done a great deal of work in improving the buildings on campus so that they abide by federal building regulations as well as environmental standards. Under the direction of the Technical Services Manager, an extensive process of upgrading the heating systems and energy efficiency of the entire campus has begun. As is mentioned in the Energy chapter, a number of buildings have been fitted with upgraded heating controls that allow for fine tuned temperature control. The system has also had numerous leaks patched and had better insulation added to the pipes so as to minimize energy and heat loss. Recaulking the windows and joints of various buildings has also helped to prevent moisture and cold air from infiltrating through the envelope of these structures. An asbestos abatement project has been underway at the university for some time now, directed by the Project Manager, Ron Eickholt. No specific information on the program was supplied to the auditors. When buildings are built or extensive renovations done, all energy and water fixtures installed are efficient models. Beyond this, individual retrofits are considered only where significant wastage is noted.

Some of the companies contracted by the university include Siemens, Arsenault Architecture Firm. The International Chamber of Commerce (ICC) drafted 16 Principles of Environmental Protection. Siemens became a signatory to this ICC Charta in July 1992, thus committing the company to implement these principles. The 16 Priciples can be found at www.iccwbo.org/sdcharter/charter/principles/principles.asp.

The university does not yet adhere to a policy of hiring contractors on the basis of environmental practices, and an environmental impact analysis is not yet a standard procedure. However, advances have been made on the part of Facilities Management to ensure that environmental considerations are stipulated in contracts before they are tendered. This has been demonstrated recently with the renovation of the PEG building. Efforts are being made to recycle as much of the waste materials from the project as possible. While solar panels were considered for the new structure, funding was not secured for this

feature and it was hence abandoned. The insulation installed in the new building is a multi-layered system that includes a moisture barrier between three inches of rigid insulation and the inner brick wall. The heat retention qualities of the insulation augments exponentially the thicker the material gets, three inches being the optimal thickness. The building design has also incorporated double paned windows, high efficiency light fixtures and motion detectors for washroom lighting controls.

Day to day maintenance of campus buildings is performed by the Technical Services department. This staff consists of plumbers, electricians, and HVAC technicians working under the direction of the Technical Services Manager, while the carpenters work under the Trades Supervisor. The carpentry shop continues to use water based paints and less toxic materials whenever possible. The materials used in general maintenance are disposed of as they were at the time of the last audit, with most solid waste being transported to the Westmorland-Albert facility. Two major exceptions to this are untreated wood scraps, which are burned off site, and oil paint which is taken to Westmorland Albert's Hazardous Materials facility once a year. (More information on the handling of such materials can be found in the Hazardous Materials chapter.)

Currently, the procedure for maintaining buildings at Mount Allison, beyond day to day maintenance work, is as follows: when it is recognized that a building is in need of repairs a project file is started and a member of the Facilities Management team is designated to oversee the job. The extent of a repair or renovation is assessed, along with an estimate of the cost. The project is then included in the master list of projects to be considered in a given year. If ample funding can be allocated, a job contract is drawn up and bid on by interested companies. It is at this stage that environmental concerns can be addressed and potentially included in the stipulations for winning a bid. Details such as the type and components of materials used, recycling of waste generated in the project, and installation of energy efficient models can be tailored to minimize the environmental impact of a project. If a project cannot be granted the necessary funding to be completed, it is deferred until a later date, with the urgency determining the level of priority granted. Economic factors play an important role in determining this priority; Facilities Management aims to address problems before they become more expensive to repair. While this method of prioritizing is often consistent with addressing environmental concerns, it is essential that environmental urgency not be a secondary consideration. For example, upgrading the university's heating system is currently a priority as heat loss results in a direct financial loss. Installation of solar panels, on the other hand might be deferred simply because it demands a start-up cost much higher than that demanded by hooking a building into the NB Power grid. However, the university is making significant progress on this front. Facilities Management is presently considering the installation of solar shingles on the roof of the University Centre, simply because it means reducing Mount Allison's environmental impact. This type of approach is integral to making environmental concerns paramount in building maintenance on this campus.

As was mentioned in the previous audit, a strategic plan for building maintenance and erecting of new buildings on the Mount Allison campus is still pending. In the 1999-2000 school year, the "Strategic Planning Process" took buildings as one of the fundamental aspects of a comprehensive vision for the university. To this end, A.J. Diamond, Donald Schmitt and Company were hired to identify facility deficiencies and analyse the building's conditions in order to produce a coherent building plan to be released this fall.

For information regarding the type of materials composing some of the university buildings, refer to Appendix B.

Case Studies

In the fall of 1998, Northland College (approximately 800 students) in

Ashland, Wisconsin opened its Environmental Living and Learning Centre. This building, designed to house 114 students, incorporates a wide range of environmental principles into its design. “Among the special environmental features is a 120-foot 20 kilowatt wind tower to be located at the northeast corner of the building. Three photovoltaic arrays will provide efficient active solar energy collection and help study the efficiency -- one array is stationary, a second one tracks the sun's path horizontally, and the third tracks both horizontally and vertically to maximize solar gain. Fourteen solar panels placed on the roof of the south wing will preheat hot water for use by residents. Composting waterless toilets in two of the apartments will provide a demonstration of their function and efficiency. The apartments have passive solar design and share two greenhouses. Cedar shakes on exterior walls were not transported from western states, but grown in the nearby northern forests of Michigan's Upper Peninsula. Other structural wood components were similarly grown and milled in the nearby region to reduce the impact of transportation on the environment.” The building has “low flow, water saving fixtures throughout building and two waterless, composting toilets in the south wing”. In addition, the building has made use of a wide variety of environmentally-friendly materials:

- “Organic based linoleum flooring instead of petroleum-based vinyl
- Cellulose (recycled paper) attic insulation with a R-value of 45 and fiberglass and foam insulation with a R-value of 25 for exterior walls
- Furniture made from recycled milk jugs and recycled steel
- A bio-composite material for countertops in south wing
- Windows have low-emissivity coated glass, Hp-4 for south facing, and Hp-5 for the other thermopanes”

The college plans to integrate the sustainable residence into its academic offerings by introducing a course called "Sustainable Living in a College Community." (Northland Collage Environmental Living and Learning Centre http://www.northland.edu/studentlife/ELLC/index.html)

Recommendations

For Senior Administration

1. Prior to approval of significant renovations or construction on any existing or future structures on campus require that an environmental impact analysis be presented to the President. This analysis would consider the type and efficiency of materials used, the damage to local flora and fauna, the energy efficiency of the design and its ability to maximize renewable environmental resources.

2. Encourage the reduction of toxic building materials by providing funds for the purchase of non-toxic alternatives.

3. Establish a long term building plan for the university. This should include tentative construction dates for future buildings and those needing replacement within the next 30 years. Set goals on capacity, energy use, building quality and design. Begin a long-term building fund.

4. Make a commitment to eliminate purchases of all old growth wood products.

For Staff:

5. Demand full corporate disclosure of all products and procedures used by companies entering or under contract with the university. The disclosed material and processing information should then be made available to all concerned individuals.

6. Make a commitment to favour structural designs which have a smaller environmental impact when these designs are less than 5% more expensive than alternative proposals and are compatible with the architectural makeup of the campus. Favoured designs would include:

a) Plans sized for optimal use of building materials

b) Space for recycling containers

c) Recycled products (eg: carpet, tile, furniture)

d) Low toxicity floor and wall coverings

e) Efficient energy and light fixtures

f) Optimal use of passive energy from shade and sun using windows

g) Insulation which significantly exceeds existing building codes

h) High quality ventilation system

i) All contract agreements include a clause outlining the treatment of solid waste by the contracted company. This agreement would demand that a concerted effort be made by the company to:

j) maximize the efficiency of all materials used

k) use recycled and environmentally friendly materials whenever they are less than 5% more expensive than the non-recycled alternatives.

l) sort and recycle all recyclable solid waste.

7. Encourage the reduction of waste in the carpentry shop by providing funds for the removal of recyclable waste (wood, metal) to recycling centres.

8. Establish a data base to record and address maintenance issues as quickly as possible. This should be assessable to all staff, students and faculty for input. A well maintained building is generally less harmful to the environment, and observations made in existing buildings can help in designing better buildings in the future. Continue to keep accurate and accessible records of building maintenance done.

9. When replacing building materials, recommend the use of environmentally friendly alternatives (e.g: paint, lights, ventilation etc.)

10. Make an effort to recycle waste such as wood and metal. Reduce the use of toxic chemicals whenever possible. Buy nontoxic alternatives.

For Faculty:

11. Take the initiative to kindly report any facility defects you find to Facilities Management by e-mailing fixit@mta.ca

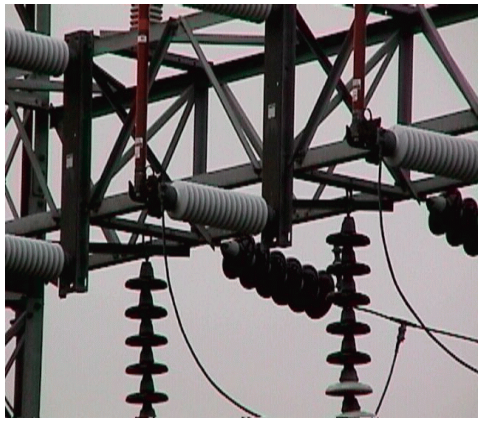
For Students:

12. Take the initiative to kindly report facility defects you notice to Facilities Management staff, by phone or by e-mailing fixit@mta.ca

Figure 4.2 Review of Current Environmental Policy

Current Performance Indicator	Current State of Affairs	Proposed Change to Performance Indicator
Response time for building maintenance and repairs is monitored and minimized. Neglected maintenance tasks generally increase energy use and potential harm to the environment.	This is the general case with most repairs. Some repairs take priority over others and therefore some get bumped down the priority list. There has recently been a system established to better track work orders.	No change proposed.
Prior to new building projects, an environmental impact analysis is completed and such impact is minimized through appropriate selection of materials or design elements.	Environmental impact analyses are conducted in some but not all cases	Require that environmental impact analyses be conducted prior to all new construction and major renovations.
Building construction or renovation makes use of environmentally friendly materials and disposal procedures.	While the use of such materials is not yet the norm some headway has been made on this issue.	Define what environmentally friendly materials and disposal procedures are.

Letter Grade: C



Energy

Introduction

Between June 1, 1998 and May 31, 1999, 11 754 265.7 kilowatt hours of electricity were consumed at Mount Allison. These totals show a 1 620 936.7 kilowatt hour increase in annual consumption compared to 1997-1998 totals. Although energy efficiency has increased on the campus through maintenance of various systems, building renovation, and an energy conservation program begun in the 1980's, the overall energy consumption has also increased. This increase can be attributed to a larger number of energy users. The university's oil consumption has decreased since 1998 (the oil consumption in the 1997-1998 fiscal year was 2 537 648 litres) by approximately 255 012 litres in 1998-1999 fiscal year and 430 628 litres in 1999-2000. The drop in oil consumption can be partially attributed to more efficient systems, but it is primarily due to milder winters.

Environmental Significance

The production and consumption of energy is the source of numerous environmental concerns. "Canadians consume more energy per capita than any other country"[1] and though this is typically attributed to the cold winters, there are in fact a number of other factors contributing to this ranking. As a typical first world nation, we have a tendency to view energy as a limitless resource and consequently make very few efforts to limit our usage. To be effective, energy conservation requires changes in individual habits, as well as ensuring that appliances and fixtures are making the most efficient use of the energy being supplied. An 18 watt compact fluorescent light bulb has a lifespan ten times longer than that of a 100 watt incandescent bulb and costs approximately $0.90 less in energy per month. Opening the curtains instead of turning on the lights, and ensuring that when the lights are turned on, the bulbs are an efficient model (ie. compact fluorescent) will reduce energy wastage not only at Mount Allison, but globally.[2]

Mount Allison purchases its electricity from NB Power, whose net generating capacity of 4006 megawatts is derived from a variety of resources, mainly non-renewable, throughout the province. These include burning of fossil fuels such as oil and coal, hydro, nuclear, combustion, and purchases from outside the province[3]. When fossil fuels are burned they emit greenhouse gases into the atmosphere. The accumulation of these gases creates a blanket effect, trapping heat from the sun and causing an unnatural increase in global temperatures. Though hydro-electricity is often considered an environmentally friendly alternative to fossil fuels, and is often classified as a renewable energy source, the dams built to harness the energy from

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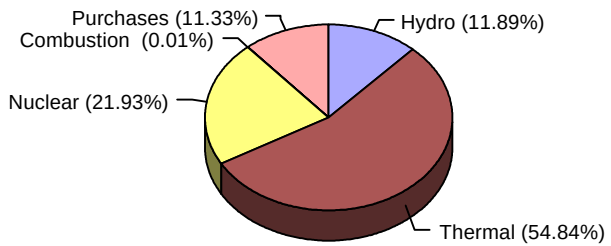
[1] Information obtained from www.davidsuzuki.org/hugeenergyappetite.htm

[2] This assumes that the cost of energy is $0.05 per KWh. Information obtained from the Residential Energy Efficiency Database at www.its-canada.com/reed/savings/lighting.htm

[3] This break down and the percentages contained in the accompanying pie graph are taken from NB Power's annual report for 1998-99 at www.nbpower.com/en/about/corpinfo/statistics5_eng.pdf

moving water have contributed to the destruction of wildlife habitat and forests, as well as displacing large numbers of people, as was the case at the Three Gorges Dam on the Yangtze River. "Recent data suggests that when a new hydroelectric facility is designed to impound water in a large, relatively flat forested or vegetated area, the amount of methane released by the breakdown of rotting vegetation may place it up there with gas, oil or coal-power electricity as a source of greenhouse gas emissions."[4] Nuclear energy, like hydro, is often considered a clean alternative to fossil fuels. Yet environmental disasters like the Chernobyl incident on April 25, 1986, wherein the testing of a reactor at the Ukrainian plant created a series of explosions that blew the lid off the reactor causing radioactive contamination to spread over a 20 mile radius around the town. In addition, nuclear power is far from being a clean energy source. In 1995, NB Power's Point Lepreau nuclear facility had over 1 300 000 kilograms of nuclear fuel waste in storage at the site. This waste has a half-life of up to15.8 million years[5] While a number of countries have sought to phase out nuclear power, Canada continues to expand this source instead of seeking out cleaner and more renewable means of generating energy. Currently, the only alternative being actively sought out by NB Power is natural gas. Natural gas, while more clean-burning than other fossil fuels, nevertheless comes with its share of greenhouse gas emissions. Renewable energy sources, such as solar, wind, and geothermal are rapidly becoming more efficient and more accessible alternatives. In order to take advantage of the technologies that harness these types of energy, it is imperative that industry and suppliers, such as NB Power make the transfer early so as not to postpone the payback period.

Sources of Energy at NB Power



Current Environmental Policy

"Under this policy, the University will endeavour, through the supervision of the Department of Facilities Management, to minimise energy consumption, reduce emissions and reduce the consumption of fossil fuels.

The performances indicators for this section are as follows:

- A baseline has been established as a standard against which improvements in energyconsumption can be measured.
- Projects to increase energy efficiency or decrease pollution have been undertaken wherever there was an acceptable payback period of the costs required to undertake the project.
- A holistic approach to utilities management is used. A holistic approach implies that energy costs should be analysed by taking into account all energy types rather than examining individual systems or energy types in isolation
- Buildings not in used during the summer are closed.
- Government initiatives are monitored to ensure participation in relevant programs in the areas of pollution reduction and energy efficiency.

[4] http://www.earthfuture.com/climatesofchange/#6

[5] Iodine129 has a half-life of 15.8 million years. ("Top 10 Myths of the Nuclear Industry", Action Group on Nuclear Issues, Sussex, NB, 1997)

- Buildings are constructed incorporating energy efficiency and renewable energy technologies." (Section 2.2, Mount Allison University Environmental Policy, www.mta.ca/environment/)

Responsible Parties

Perry Eldridge, Technical Services Manager in the Department of Facilities Management, is responsible for managing energy systems on campus.

Audit

Mount Allison University purchases electricity solely from NB Power, the provincially owned and operated utility company. Between June 1, 1998 and May 31, 1999, Mount Allison consumed 11 754 265.7 kilowatt hours of electricity which cost the university $845 068.7. These totals show a 1 620 936.7 kilowatt hour increase in annual consumption compared to 1997-98 totals. Energy consumption reaches its peak in September, followed closely by the winter months and April. During the winter, the demand for heating in those buildings heated by electricity (Sprague, Central Stores, Bermuda, Carriage, Cuthbertson, and Facilities Management) can account for the increased consumption, though the figures for the months of September and April are more difficult to justify.

As was the case in 1998, NB Power bills the university for both energy and demand. Energy charges are the standard charges (approximately 7.56 cents) for each kilowatt hour of energy consumed. The demand charge is an additional fee for the highest amount of energy demanded by the consumer for a period longer than fifteen minutes. This fee allows the supplier to charge for the assurance that this amount of energy will be made available to the consumer, though it is by no means the average rate of consumption. There are 18 buildings owned by the university that are metered individually, most of which are off the main campus[6]. The main campus is metered centrally through the Physical Plant. Though individual metres were recently installed in the remaining buildings, this system is still being set up and readings are not yet available. As a result, it is not yet possible to obtain accurate data on the amount of energy consumed per building. When the readings become available, it will be possible to establish a precise baseline for the university and base future energy conservation efforts on this data. Nonetheless, there are a number of buildings known to be major consumers simply because they contain equipment that demands large amounts of energy. These include Barclay, and the Athletic Centre.

Buildings at Mount Allison are heated one of three ways: electrically, light oil, and bunker oil. The buildings heated by each type of energy have not changed since the last audit[7] and are as follows:

- Electricity: Sprague, Central Stores, Bermuda, Carriage, Cuthbertson, Facilities Management.
- Light Oil: Hess House, Baxter, Black, Canadian Studies, Colville, Cranewood, McGregor, Pavillion Bousquet.
- Bunker Oil: all other buildings

In the seven buildings that are heated electrically, approximately two thirds of the monthly energy bill is devoted to heating. Prior to renovation, the PEG's oil heating was supplemented with electricity where pipes could not be attached to the system[8].

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[6] The energy consumption data for these buildings and for the main campus can be found in Appendix C.

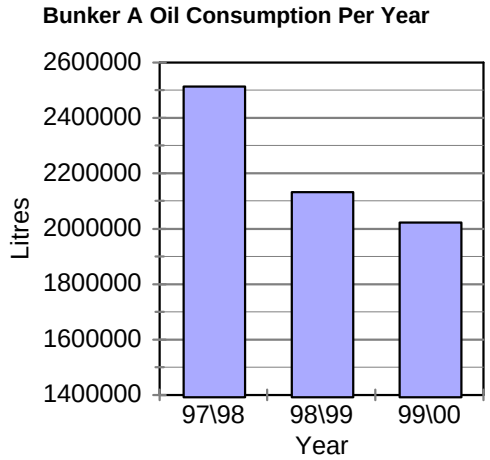
[7] French House has been taken off the list as it was torn down in the summer of 1998. The monastery is now called the Pavillion Bousquet.

[8] Complete details on the PEG renovations, that took place in the summer and fall of 2000, are contained in the Buildings chapter.

The buildings heated with light oil make use of a furnace on the premises. This system works as would any domestic oil furnace, the oil is brought on site and is burnt inside the furnace and the resulting heat is used to heat the air which is pumped through air ducts. Between May1, 1998 and April 30, 1999 Mount Allison purchased 151 481 litres of Light Oil at an average of 13 cents per litre. In the following year, the consumption was reduced by nearly half to 84 220 litres, but at an average cost of 37 cents per litre. This drastic drop in consumption is likely due to a milder winter. A breakdown by month for light oil consumption can be found in Appendix D.

The central heating system is run from the Heating Plant in the Facilities Management building. The system works by heating water to its boiling point to produce steam. The water is heated using bunker oil number 5. The oil is mixed with air, atomized and injected into the boiler to be burnt, and to produce enough energy to boil the water. Once the water is evaporated the steam is put under 45 pounds per square inch of pressure and sent through the pipes towards the buildings that are to be heated. When the steam arrives at the desired building it is slowed down to 15 pounds per square inch of pressure and then travels through a heat exchanger which heats water from a closed loop that is inside the building. As the steam cools off in the heat exchanger it condenses and the remaining water runs back to the Heating Plant to be put through the cycle again. The water that has been heated in the heat exchanger moves through pipes inside the building and progressively heats the surrounding air.

Over the last three years, Mount Allison has been consuming progressively less Bunker A Oil, as can be seen in Figure 11.3. A month by month breakdown of bunker oil consumption can be found in Appendix E. Between May 1, 1998 and April 30, 1999 Mount Allison University purchased 2 131 155 litres of Bunker A oil which cost a total of $337 913.75 (at approximately 12-15 cents per litre). This is a total of 360 245 litres less than what was purchased between May 1 1996 and April 30 1997. Between May 1, 1999 and April 30, 2000 2 022 800 litres were purchased at $490 090.51. This irregularity in the ratio of quantity to price emerging last year is due to the doubling in oil prices this winter. Mount Allison is currently investigating using natural gas as a more economical and cleaner burning alternative for providing heat on campus. The central boilers on campus are fashioned in such a way that they can effectively burn bunker oil or natural gas. As of yet, any action on this front is dependent on availability of the gas via a pipeline from Sable Island.



Under the direction of the Technical Services Manager, Mount Allison has undertaken a number of projects to increase energy efficiency and decrease energy consumption on campus. The heating system is now almost entirely leak free and fully insulated to ensure minimal heat loss as the steam travels through the pipes circulating heat through the buildings and back to the boiler. Heating in buildings has also been the target of improvements recently, with radiant technology replacing less efficient methods. Radiant heating works to heat the objects in a room as opposed to the air. The floor is heated, the heat then radiates to the objects in the room, and from there radiates to the air circulating through the room. This method has proven more efficient as it works through the objects which normally “steal” heat from the air. Renovations to Jennings and to the PEG both included radiant heating system. Increasing the efficiency of existing heating systems has been achieved in a few buildings, including Harper Hall and the library, by installing computerized thermostat controls that take into account both indoor and outdoor temperatures to fine tune heating in order to avoid waste. This means that if it is cold outside, but the indoor temperature remains comfortable, the heat will not automatically be turned to

a standard winter setting.

Ventilation systems are also major consumers of energy, particularly where they are not well-suited to the air flow of the building or the demands resulting from fumes. In 1998, the Fine Arts building underwent improvements in its ventilation system. Since then, plans have been made to bring other buildings on campus up to standard. Currently, ventilation in the Barclay building is being upgraded with better controls, and more energy efficient exhaust fans. Information on ventilation and heating systems found withhin buildings on campus can be found in Appendix F.

Air conditioning also requires input of energy to cool the buildings. There are a variety of cooling systems on campus, including cooling coils, air cooled chillers, water cooled chillers, and roof top units. Barclay, Crabtree, the Library, the Owens, and the PEG, (both old and new), the Library's being the largest system. A number of the bathrooms on campus have exhaust fans, as do Barclay and the Fine Arts building. Exhaust systems operate from fans on the roofs of these buildings.

Many of the T12 fluorescent lights have been replaced with T8 models, which use 12 watts less energy per bulb. In addition, control systems monitored by heat and motion sensors automatically turn off lights when no one is in an area for a set amount of time (generally 15 minutes). These systems, made by *Wattstopper* have been installed in the computer labs, classrooms, and washrooms of Avard Dixon and have halved the energy consumption in these areas. Typically, energy efficient fixtures are installed when a building or section of a building is renovated, when a new building is erected, and on a fixture-by-fixture basis when it is economically feasible. While no records are kept of random retrofits, the energy survey done in 1998 has been updated to include retrofits done in all recorded renovations in the two years since then.

An additional effort to reduce energy consumption at Mount Allison has been made on the part of the security staff, as the auditors discovered when accompanying officer Roger Embree on one of his shifts. During their nightly lock up procedure, the university's security officers turn off all hall and washroom lights not required for emergency lighting, thereby saving the school money and energy. Almost all vacated buildings had hall and bathroom lights left on, while most office lights had been turned off. In addition, many computers had been left on, with only the automatic screen turn off feature saving energy. This might be a result of a misunderstanding as to how this mechanism works, and not a blatant disregard for energy conservation. All photocopiers and fax machines are left on at night to avoid having to reset them each morning.

Energy Survey

As part of the 1998 audit, an extensive energy survey was conducted. What resulted was a comprehensive listing of the number of each type of energy consuming fixture or equipment on university property. By estimating the number of hours a day and the rate at which each item was consuming energy, the auditors were able to arrive at a total per building to compare against the actual metered amount that appeared on monthly invoices from NB Power. Consumption was also calculated in terms of kilowatt hour per square foot of floor space or per resident, with the Athletic Centre and Thornton House emerging as the biggest consumers. Changes to total energy consumption are extremely difficult to pinpoint with most of the main buildings still being billed through a central meter at the Heating Plant. In addition, there are a number of factors contributing to a potential reduction in energy consumption since 1998, including retrofits of individual fixtures, improvements to insulation, improvements in the HVAC (Heating, Ventilation, Air Conditioning) systems, renovations, and, of course, better energy conservation habits amongst members of the university community. On the other hand, there are a number of factors that might account for the increased amount of kilowatt hours purchased by the university in the last two years, including a larger student body, the growing concern for safety which has justified a need for more lamp posts and an upgraded emergency lighting system in Avard Dixon, Centennial Hall, the Library, and the Chapel. It is for these reasons that the energy survey was not repeated in full, but was instead used as a guide for rating consumption in university buildings. A complete tally of fixtures, et cetera is contained in the 1998 audit, while Appendix G shows a list of alterations that have likely increased or decreased Mount Allison's energy consumption since the time of the last audit. It is understood that when the

metering system is fully operational, these figures can be used to locate discrepancies between the energy load demanded by the various equipment in these buildings and the consumption measured by the meters.

Alternative Energy Sources

Since the last audit, renewable sources of energy such as solar, wind, and geothermal have become more accessible as the number of suppliers of this equipment has increased and the efficiency of the technology has improved. Mount Allison has begun to take advantage of these technologies with a proposal to install solar shingles into the roof of the Student Centre, though this decision is subject to outside funding being secured. The auditors also followed up on the research done in 1998 on the feasibility of supplementing the university's current energy supply with energy generated by a wind turbine that would take advantage of the strong winds on the Tantramar marsh. A more complete description of solar and wind technologies and the logistics of implementing these alternatives at Mount Allison is contained below. The question: "Do you support the introduction of alternative energy sources (wind turbines, solar panels, et cetera) as a means of supplementing the current energy sources used on campus" was asked in the Environmental Audit Campus Questionnaire; 116 out of 118 respondents answered yes, although many people are only willing to support it if it is deemed financially feasible.

Solar

Solar power is created by harnessing the low-energy radiation of the sun. Solar power can be divided into two main categories: solar thermal power, which harnesses the heat of the sun, and photovoltaic (PV) power, which transforms the sun's light into energy. Solar thermal power can be used on a small scale for "water heating systems by using a flat plate collector to capture heat from the sun."[9] On a small scale, Photovoltaic cells can provide electricity for a wide variety of uses. "PV systems are easy to operate, rarely need maintenance and do not pollute the environment."[10] Mount Allison could make use of solar thermal power by installing a solar water heater in one building. If the project was successful, it could be implemented in other buildings. The university is already investigating ways to utilize photovoltaic power. Projects under consideration include the addition of solar panels to the newly-renovated P.E.G building and using solar shingles when repairs are made to the roof of the Student Centre this summer. In the case of both solar thermal power and photovoltaic power, there would higher costs associated with set-up. However, after this initial stage, costs would be off-set by savings on energy bills and government support.

Wind

"Almost all wind turbines producing electricity consist of rotor blades which rotate around a horizontal hub. The hub is connected to a gearbox and generator, which are located inside the nacelle. The nacelle is where all the electrical components are located, the electrical switch boxes and the control system, and this is the large part at the top of the tower. Most wind turbines have three blades which face into the wind; the wind turns the blades round, this spins the shaft, which connects to a generator and this is where the electricity is made. A generator is a machine that produces electrical energy from mechanical energy, as opposed to an electric motor which does the opposite. Wind turbines start operating at wind speeds of 4 to 5 metres per second (around 10 miles an hour) and reach maximum power output at around 15 meters/second (around 33 miles per hour). At very high wind speeds, i.e. gale force winds, (25 metres/second, 50+ miles/hour) wind turbines shut down."[11]

In discussions with a number of people (at Mount Allison, NB Power, and the Atlantic Wind Energy Test Site, among others) the auditors assessed the feasibility of supplementing the power bought from NB Power with wind energy. The Tantramar marsh has been identified as one of the top two sites in the province in terms of the wind regimes necessary to generate power using a wind turbine. The

[9] http://solstice.crest.org/renewables/re-kiosk/solar/solar-thermal/theory/index.shtml

[10] http://solstice.crest.org/renewables/re-kiosk/solar/pv/overview.shtml

[11] http://www.bwea.com/primer/faq.html#madeof

university farm property has been identified as a potential site for a turbine as it would require no leasing of land, and is relatively close to the campus. Connecting the turbine to the campus would have to be considered, a buried wire was suggested as one possibility. Connecting the smaller turbine into the main university power system might not be as advantageous as using it to power a single building. This is because it would be hard to measure the actual savings in kilowatt hours if the energy generated by the turbine were included in the total figures. These figures reflect a number of factors including other energy saving measures like retrofits, as well as increases in overall demand as more equipment such as computers are brought onto the campus each year with the increase in student population. By using the turbine to power a single building, results would be more easily measurable. As the farm is closest to the Satellite houses, it might be most feasible to begin by connecting to one of these residences. A second option is the new residence which would be an ideal way to institute renewable energy without the complication of switching over from the current energy source. This residence is to be located on the corner of York and Salem (where Hillcrest House currently stands) and is thus within reasonable proximity to the farm.

One major consideration when studying the prospects of wind energy at Mount Allison is the school's dealings with the current energy supplier, NB Power. At the time of the last audit, the supplier was unwilling to consider allowing the school to disconnect a building from the energy grid because it would mean losing business while the turbine was running and having to provide back-up energy when it was not. NB Power customers were and still are permitted to produce a maximum of 375 kilowatt hours (500 Horse Power) of energy at a time. Presently, NB Power is awaiting what they anticipate to be significant changes in policy with the provincial meeting on energy policy this September. The auditors were informed that this meeting would assess the state of energy sources in the province and at this time the introduction of renewable sources would likely be considered with potential changes to New Brunswick's policy on supply from these sources. Ettienne Roussell, a representative of NB power, assured the auditors that should the university choose to further investigate the feasibility of a wind turbine, NB Power would be willing to work toward a compromise.

Geothermal

Geothermal heating technologies take advantage of the constant temperatures below the earth's surface. A heating system of this type requires a heat source or sink (in the form of a water well or a closed loop running through the ground), a heat exchanger (which works on the same principle as a refrigerator), and duct work to circulate the air inside the building. Maritime Geothermal Ltd. is located in Peticodiac New Brunswick. This local company manufactures and instals heat pumps.

Case Studies

Wind and Solar

The Environmental Living and Learning Center at Northland College makes use of a variety of alternative energy sources. The centre is a college residence designed to accommodate 114 students. Among the building's "special environmental features is a 120-foot 20 kilowatt wind tower to be located at the at the northeast corner of the building. Three photovoltaic arrays will provide efficient active solar energy collection [...] One photovoltaic array is stationary, a second one tracks the sun's path horizontally, and the third tracks both horizontally and vertically to maximize solar gain. Fourteen solar panels placed on the roof of the south wing will preheat hot water for use by residents." The building's layout also allows one wing to take advantage of passive solar heating.
(http://www.northland.edu/studentlife/ELLC/index.html)

Geothermal

Baie-Ste-Anne is located on the shore of north-eastern New Brunswick in a climate that is comparable to the one in the Sackville area. In 1989 the local Caisse Populaire (credit union), located in a 1700 square foot building, was renovated and expanded to the current size of 4000 square feet. After consulting with NB Power on heating systems and having seen the comparison of cost for both an electrical baseboard heating system and a geothermal heating system the institution decided to instal a groundwater heat pump. Although the heat pump cost approximately $1400 more

than the conventional system, the payback period was less than one year. The payback occurred through energy savings. Additional cost for the duct work was in this case not an issue since air conditioning was going to be installed regardless. Even though the building has more than doubled in size the electric bill is only $633 more than the charge for the previous building. Other energy conservation measures were also installed during the renovation, such as T8 flourescent light fixtures, passive solar design ideas, good insulation and Low E glass for windows.

Recommendations

For Senior Administration:

1. Develop a policy to use alternative energy sources whenever possible.

2. Secure funds to hire a student to seriously research the possibilities of wind energy use on campus, perhaps in the form of a feasibility study.

3. Create a policy that limits what students can bring into their dorms, eg all mini fridges must meet *Energuide* guidelines, only one fridge per room, etc.

4. Indicate to NB Power a desire to purchase renewable energy.

For Staff:

5. Test out the effectiveness of a solar hot water heater by installing one in one of the satellite houses (ie Cuthbertson). If successful, future installations should be considered.

6. Equip more rooms with *Wattstopper* technology.

7. If you notice a classroom or office not being used with the lights on, turn them off.

8. Post signs or small stickers beside light switches in academic buildings and residences (including bathrooms) requesting people to turn lights off when leaving the room.

9. Post signs in the computer labs reminding students that if they are working past lock up time to turn off the computers when they leave.

10. Records of retrofits should be kept as a means of monitoring the results of energy and water conservation efforts. This would enable the university to better understand fluctuations in energy and water consumption.

For Faculty:

11. When not using your personal computer for a half hour or more, turn it off. Turn off the monitor whenever it is not in use. This saves energy and is better for the computer.

12. On sunny days consider if it is necessary to have lights on. If you teach in a classroom with more than one light switch use a few of the overheads as possible (without compromising the students' eyes)

13. Report overheating, over lighting, etc. to Facilities Management.

14. If applicable to your class, assign projects that would consider feasibility of alternative energies on campus.

For Students:

15. When not using your personal computer for a half hour or more, turn it off. Turn off the monitor whenever it is not in use. This saves energy and is better for the computer.

16. When working in the computer lab during low traffic periods, take the

initiative to turn some unused computers off; new arrivals can easily turn them on again.

For Administration, Staff, Faculty and Students:

17. If you have heating controls in your room, use them responsibly. Consider putting on a sweater rather than turning up the heat.

18. Always remember to turn lights off whenever leaving the room. It is a myth that turning lights on and off uses more energy than leaving them on.

19. When working at your desk, use the desk lamp rather than lighting up the entire room.

20. If you see any heating or electrical problems, let Facilities Management know through fixit@mta.ca so that the problem can be fixed.

Figure 5.1- Review of Current Environmental Policy

Current Performance Indicator	Current State of Affairs	Proposed Change to Performance Indicator
A baseline has been established as a standard against which improvement in energy consumption can be measured.	The meters required to establish a baseline have been installed, but are not yet running. When readings can be taken, a baseline will be established.	No change proposed.
Projects to increase energy efficiency or decrease pollution have been undertaken wherever there were an acceptable payback period of the costs required to undertake the project.	A number of steps have been taken to improve energy efficiency including retrofitting of fixtures, energy saving features on computers and lights.	No change proposed.
A holistic approach to utilities management is used. A holistic approach implies that energy costs should be analysed by taking into account all energy types rather than examining individual systems or energy types in isolation	The university has begun investigating alternative energy sources including solar shingles, despite the cost difference. More research needs to be done on the feasibility of using renewable energy sources on this campus.	No change proposed.
Buildings not in used during the summer are closed.	Most buildings are used during the summer. Residence buildings are frequently used for conferences and other buildings often undergo repairs or renovation and would be in need of the utilities.	No change proposed.
Government initiatives are monitored to ensure participation in relevant programs in the areas of pollution reduction and energy efficiency.	Government initiatives are monitored by the staff in the Facilities Management department.	No change proposed.
Buildings are constructed incorporating energy efficiency and renewable energy technologies.	Newly constructed buildings on campus do not yet take full advantage of energy efficiency and renewable energy technology.	No change proposed.

Letter Grade: C

Transportation

Introduction

While the university fleet has increased by one vehicle since 1998, the amount of use these vehicles get has not changed dramatically since then. One bike rack has been installed since the last audit and there are plans to install another this year. Of the students, staff and faculty who responded to the Environmental Audit Campus Questionnaire, 27.73% most commonly travelled to and from the university by car.

Environmental Significance

Fossil fuel propelled forms of transportation impact our natural environment in many ways: infrastructure, sound pollution, and air pollution. Transportation also generates waste, both from oil and in the body of the automobile. It also affects our personal health and environment by making us less active (driving instead of walking or cycling).

"In 1995, fossil fuel propelled forms of transportation were responsible for more than 27 percent of Canada's total greenhouse gas emissions. For individual Canadians, transportation accounts for almost half of greenhouse gas emissions, primarily due to automobile use."[1] The most notable greenhouse gas emitted from the use of automobiles is carbon dioxide. When carbon dioxide is released into the atmosphere in quantities that cannot be naturally regulated by the earth's coping devices, it combines with other greenhouse gases trapping heat in the atmosphere. This phenomena is called the greenhouse effect and causes global warming, "an increase in the near surface temperature of the Earth."[2] By using our cars less and choosing instead to walk or bike we can significantly reduce our effect on the planet's climate.

Today, the demand for gasoline is at its highest ever. As demands continue to rise, world supplies of this nonrenewable resource are steadily approaching depletion. This spring, gasoline prices surged as high as 85 cents per litre when the Organization of Petroleum Exporting Countries limited production of petroleum. Natural gas prices are also on the rise and it is anticipated that supplies will not be sufficient to meet current demand.. By reducing our dependency on automobiles, and by switching to alternatives to these fuels, we can secure a more sustainable means of transportation for the future.

With less traffic congestion in the municipality and around campus, the concentration of emissions is reduced. Figure 12.1 is a chart of the top three pollutants emitted from automobiles, along with health and environmental impacts [3]

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[1] http://www.davidsuzuki.org/

[2] http://www.epa.gov/globalwarming/glossary.html

[3] 3Adapted from the Automobile Emissions, Individual Health and the Environment chart on Environment Canada's Greenline website: www.ec.gc.ca/emission/2-6e.html

Figure 6.1 Automobile Emissions and the Environment

Pollutants From Automobiles	What It is	Environmental Impacts
Nitrogen Oxides (NOx)	Nitric Oxide (NO) is the major NOx component and oxidizes into nitrogen dioxide (NO2) in the presence of hydrocarbons and sunlight. NO2 reacts with hydrocarbons to form ozone or with water to form nitrate (NO3), a significant source of acid rain.	NO2 reacts with water vapour to form nitrate (NO3), a source of acid rain . Acid rain accounts for an annual loss of $197 billion in commercial forest wood products and a further $1.3 billion due to recreation and wildlife habitat destruction - corrosion of metals and degradation of textiles, rubber and polyurethane - suppressed vegetation growth - ground-level ozone formation , stratospheric ozone depletion
Carbon Monoxide (CO)	CO is a colourless, odourless and tasteless gas produced through the incomplete combustion of organic materials. Personal vehicles are one of the main sources of CO, accounting for 54% of total CO emissions. Cars operating at colder temperatures (during winter or engine warm-up) produce significant quantities of this poisonous gas.	CO released into the atmosphere depletes the atmosphere's supply of OH (hydroxyl radical) which is the main natural cleansing agent of the atmosphere. As a result, CO emissions contribute to increases in methane, partially halogenated CFCs and the formation of ozone under certain NOx conditions.
Carbon Dioxide (CO2)	CO2 is a gas that comes from the decay of materials, respiration of plants and animal life and the natural and human-induced combustion of materials and fuels. Since the industrial revolution, the natural of release and absorption of CO2 in the atmosphere has become unbalanced due to an increase in human-produced CO2 which contributes to global warming.	CO2 is the most significant greenhouse gas contributing to global warming

By reducing our dependence on automobiles as a means of transportation for distances that can easily be walked or cycled, we can slow the accumulation of these pollutants and thus reduce the environmental and health impacts caused by nitrogen oxide, carbon monoxide, carbon dioxide, and others.

Current Environmental Policy

"Under this policy, the university will endeavour, through the supervision of Facilities Management, to minimise energy consumption and to reduce emissions and the consumption of fossil fuels.

The performance indicators for this section are as follows:

1. Bike racks are available at academic and residence buildings.

2. Emission levels are taken into consideration in the purchase of vehicles" (Section 2.4, Mount Allison University Environmental Policy, www.mta.ca/environment)

University Vehicles

Responsible Parties

The University vehicle fleet is the responsibility of the Director of Facilities Management.

Audit

The Mount Allison University campus is a designated pedestrian area which is accessed only by university vehicles. No public vehicles are allowed to travel on campus grounds. However this is not always the case, many members of the university community park their vehicles on campus or are dropped off next to their respective buildings (this sometimes occurs for medical reasons).

There have been three new vehicle purchased by the University since 1998. The use of University vehicles is as follows:

3. Garbage/Moving truck
4. 4X4 truck used for snow plowing and miscellaneous tasks in the summer
5. Three pick-up trucks to transport plumbing, carpentry and custodial tools and supplies
6. Two vans to transport electrical and carpentry tools and supplies
7. One van for the Heating and Ventilation crew
8. Support Services van for delivering mail
9. Sodex'ho Alliance van for delivering food

All of the vehicles are powered by gasoline except for the garbage truck which is powered by diesel.

The recent increase in gas prices, coupled with a growing awareness about the impact of fossil fuels on the global climate, has led to a variety of alternatives to fossil fuel burning engines being introduced on the vehicle market. In the past year, the range of technologies has soared with the manufacturing and testing of electric cars, clean-burning diesel engines, hybrids and fuel-cells.

A variety of automobile manufacturers have seized upon these new technologies. This spring Daimler-Chrysler, GM, Ford, and Toyota all unveiled "green" vehicle models for sale at prices significantly lower than was anticipated just a few years ago. The majority of these alternatives are being installed in compact cars based with the understanding that smaller automobiles use less resources to create and run and are thus more environmentally friendly overall.

Among the selection of clean-burning diesel fuel technologies is Westport Innovations Inc. of Vancouver, British Columbia. This concept "attempts to cut

air pollution by allowing diesel engines to run on clean-burning natural gas"[4]. Because Mount Allison's vehicle fleet is comprised of vans and trucks, as opposed to compact cars, clean-burning fuels and more efficient engines are likely the most feasible alternatives in the range of "green" transportation technology on the market today.

Case Studies

Diesel

Biodiesel is fuel which is made from regular diesel and biological oils such as vegetable oil or soy bean oil. This alternate fuel can either be used at a 100% pure level or mixed (usually at 20%) with traditional diesel. "Biodiesel can be operated in any diesel engine with little or no modification to the engine or the fuel system."[5]

"Deer Valley School District, located in Phoenix, Arizona, has over 120 buses running on B20 (20% biodiesel, 80% diesel), and are about to consolidate with another district and expand the program."[6]

"All 64 vehicles in the ARS (Agriculture Research Service, United States Department of Agriculture) fleet in Beltsville, Maryland are running on B20. The vehicles are all high usage versus high miles and are used regularly over the 6,700 acres of ARS property. The vehicles include tractors, dump trucks, tractor trailers, bucket trucks, combines, choppers, small riding mowers, and the visitor shuttle bus."[7]

Propane

Propane is a by-product of the oil refining process and of natural gas extraction. There is a propane refuelling station in Memramcook, and the possibility of constructing a small refuelling station in Sackville. A gasoline engine can be easily retrofitted to run on propane by a certified expert. This conversion requires only five new parts: a converter, which is a combination vaporizer and pressure regulator; an air-gas mixer, similar to a carburetor, that mixes air and propane; a dual-control processor, which is a small computer that adjusts fuel delivery; a lock-off filter/valve, which stops the flow of fuel to the engine; and a propane tank.

For the last 10 years, Manistee County, in Michigan's Lower Peninsula, has operated a fleet of buses on propane. Today, 20 of its 23 buses run on propane. Richard Strevey, the county's fleet manager, states, "Propane is a very cost-effective fuel. I have yet to see the downside of using propane."

Although the primary reason that the county chose propane was the low cost of the fuel, there have been operation and maintenance cost reductions as well. Says General Manager Strevey, "The propane engines run cleaner than the diesel engines, so we have much less maintenance on the engines." For as long as Strevey has managed the fleet, there hasn't been a single engine failure in the propane buses.[8]

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[4] "Westport drives toward clean-burning diesel engines", Globe and Mail, May 9, 2000.

[5] http://www.biodiesel.org/fuelfactsheets.htm#IS

[6] http://www.biodiesel.org/deervalley.htm

[7] http://www.biodiesel.org/AgResearch.htm

[8] http://www.eren.doe.gov/cities_counties/cleanbu.html

Recommendations

For Senior Administration:

1. Support, through allocation of funds, the purchasing of “green” vehicles.

For Staff:

2. Explore alternatives to current use of university vehicles:
   - make small deliveries on foot/bicycle
   - consider the possibility of using cleaner burning fuels (eg biodiesel, propane)
   - consider purchasing "green" vehicles

3. When possible, arrange to use one vehicle for multiple tasks (eg custodial deliveries combined with carpentry deliveries).

For Staff, Faculty and Students:

4. Unless absolutely necessary, all members of the university community should avoid driving their vehicles onto the campus.

Cyclists and Pedestrians

Responsible Party

The installation of new bicycles racks and the repair of grounds damaged by pedestrian traffic is the responsibility of the Grounds Supervisor in the Facilities Management department.

Audit

Because of its relatively small size, Sackville is ideal for cyclists and pedestrians. The university itself is a mere five minute walk from downtown. Yet many people in the municipality and the university community insist on driving short distances around town and even on campus. According to the Environmental Audit Campus Questionnaire, 27.73% of staff, students and faculty use a car to get to work, 4.20% bicycle to work, 62.18% walk to work and 5.88% use a combination of these methods to get to work. In the last audit, 49% drove, 36% walked or cycled and 15% used a combination of car a walking or cycling. The discrepancy between the current numbers and those collected in 1998 can be attributed to the fact that this year students were included in the survey. Many students live on campus or are within close walking distance. Of the survey respondents who lived within five kilometres from campus, 77.08% walked, 14.58% drove, 15.21% bicycled and 3.13% used a combination of methods. Of those who responded to the survey, 9.65 % carpooled, 25.44 % did not carpool and 64.91% responded “N/A” to this question. In certain cases, a response of “N/A may be understandable (for example, those living on campus, or those who cycle or walk). However, there should be a greater effort made by those who drive to car pool whenever possible. To facilitate this effort, there is an informal drive board in the Student Centre. The drive board is most commonly used to arrange rides on an individual basis. Ideally, Students, staff and faculty could also use the board to make long-term carpool arrangements.

The Mount Allison campus was designed with pedestrians and cyclists foremost in mind, with paved walkways leading to all buildings. However members of the university community often prefer to cut across the grass to save time when walking or cycling between buildings. Though this practice may not initially appear environmentally degrading, frequent traffic has been detrimental to the vegetation, weakening the grass and wearing it away in some areas, and compressing the root systems of the trees. In 1997 an oak tree had to be cut down as a result of this compression. Although no trees have been killed

since then, approximately $4000 is spent each year repairing and replacing turf damaged by pedestrian traffic on the lawns. In order to preserve the vegetation, it is imperative that pedestrians and cyclists keep to the walkways.

Case Study

"The Purple and Yellow Bike Project is a fleet of used bikes that are available for use on the University of British Columbia campus. Bikes are locked with same keyed locks, giving all members access to all bikes. Whenever you see a bike, you are free to unlock it and ride it away. And the person that left it there will have to find another one."[9] This project is currently in its second year of operation with as many as 400 participants.

The relatively small size of the Sackville area makes it ideally suited for a similar program that might expand beyond the campus and into the surrounding town area. The UBC project works on a co-op style system where members join for a minimal fee and have access to the services that the co-op provides, which include bike repair, bike repair workshops and the use of the purple and yellow bicycles.

Recommendations

For Staff:

5. Plant hedges in areas where people cut corners to prevent the problem of pedestrian damage to the turf and tree roots.

6. Install a bicycle rack at the entrance of the Barclay building.

For Staff, Faculty and Students:

7. The university community should be encouraged to car pool, and to use the drive board in the University Centre.

8. For those staff, faculty and students who live 5 km or less from the university campus, cycling or walking to work or class is a realistic possibility for most months of the year.

9. Because neither the grass nor the root structures of the trees on campus are strong enough to support regular pedestrian traffic, all members of the university community should try to keep to the walkways in order to preserve this vegetation.

[9] http://www.ams.ubc.ca/clubs/bikecoop/indexh.html

Figure 12.2 Review of Current Environmental Policy

Current Performance Indicator	Current State of Affairs	Proposed Change to Performance Indicator
Bike racks are available at academic and residence buildings.	There are no bike racks at any of the residence buildings, and some academic buildings still do not have a rack.	No change proposed.
Emission levels are taken into consideration in the purchase of vehicles	The university has purchased three new vehicles since the last audit and they run on diesel fuel and gasoline.	No change proposed.

Letter Grade: D

Air Quality

Introduction

In 1998, 13 312 290.89 kg of greenhouse gases were emitted through electricity consumption and combustion of fossil fuels to heat the campus[1]. A one year period between 1998 and 2000 produced about 5 654 472.9 kg of greenhouse gas emissions. The significant drop in the amount of emissions can be attributed to the relatively milder winters that the area has been experiencing in the past two years (heating oil consumption was almost halved during this period). In 1998, it was reported that the nine vehicles in the university fleet produced 49 420 kg of CO_2(11 kg per 3.79 litres of gasoline burnt). The amount of gasoline used by the fleet (now ten vehicles) was unavailable for the 1998-2000 period, but a number was found using a rough estimate of kilometres driven and fuel efficiency for the vehicles. Approximately 33 166 kg was emitted. The amount emitted in the 98-00 period is significantly lower than the 1998 total, reasons for this being the imprecision of the numbers used to calculate the emission levels and a different method of calculation.

[1]This amount of gases is different from the amount noted in the 1998 audit because the methods of calculation were not the same. The 2000 audit method of calculation was used for both years for comparative purposes.

Environmental Significance

Sackville is fortunate in that it enjoys relatively clean, unpolluted air. This is due in large measure to the fact that the town is located in close proximity to the Tantramar marshes. Marshes serve as natural filters, storing air-borne carbon dioxide. The nature of air pollution is such that it can travel great distances. As such, our air quality can be influenced by pollution from far away, and likewise, our pollution can influence those far away. According to Environment Canada, “in the southern Atlantic region...air pollution from the Eastern United States... contributes to between 50% and 80% of the region's smog.” (http://www.ec.gc.ca/envpriorities/cleanair_e.htm) Poor air quality can be attributed to a wide variety of activities. The fossil fuels we consume for energy and transportation, the wastes we send to landfills and the manufactured goods we purchase all directly or indirectly influence air quality. The substances we emit into the atmosphere can have a variety of environmental consequences.

When sulphur dioxide (SO_2) and nitrous oxides (NO_x) are released by the burning of fossil fuels, they combine with water and oxygen in the atmosphere to form acid rain. Acid rain causes serious damage to water bodies and forests, and can threaten human health. In addition, high levels of SO_2 and NO_x are associated with increased rates of lung disorders, such as asthma and bronchitis.

The release of chlorofluorocarbons (CFCs) and other substances such as hydrochlorofluorocarbons (HCFCs), halons, methyl bromide, carbon tetrachloride, and methyl chloroform into the atmosphere contributes to the destruction of the ozone layer. These chemicals, by destroying ozone, reduce the ability of the ozone

layer to filter ultraviolet radiation. Increased radiation can threaten plants, animals, oceans and human health (http://www.epa.gov/ozone/).

Climate change has also be attributed to the release of chemicals into the atmosphere. The burning of fossil fuels for energy and transportation, agriculture, industry and decomposition of solid waste all contribute to emissions of greenhouse gases such as methane, carbon dioxide and nitrous oxides. Accumulations of greenhouse gasses in the atmosphere serve to trap heat on the earth's surface. The long term consequences of climate change are numerous and include flooding of coastal areas, severe weather conditions, and drought.

The warming of the climate is having a number of adverse effects on our natural surroundings:

- The melting of the polar ice caps due to the warming is threatening the extinction of the polar bear. The ice is thinner and the bears can no longer walk onto the ice to feed on the seals. As a result, they are not ingesting enough food and are producing fewer young.

- The Maldive Islands, located in the Indian Ocean, are also being threatened by the melting of the ice caps. "Given that 80 % of the land area [in the Maldives] is less than 1 metre above sea level the Government is understandably concerned about the potential impacts of climatic change and sea level rise"[2]

- "Drier conditions causing grassland expansion into Prince Albert National Park [Saskatchewan] could negatively affect sensitive wildlife habitat. This could endanger Canada's only protected breeding colony of American white pelicans."[3]

Of course, the most proactive way to reduce the dangerous effects of air pollution is to reduce our emissions of harmful chemicals (a list of harmful chemicals and their impacts can be found in figure 13.1). Oceans and forests also act to filter pollutants from the air. By protecting these natural sinks, the effects of air pollution can be diminished.

[2] http://www.undp.org/missions/maldives/environ.htm

[3] http://www.ec.gc.ca/climate/primer/s6-know.htm

Figure 7.1

Chemical	Common Sources	Impact
Methane (CH_4)	Emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from the wastes in municipal solid waste landfills, and the raising of livestock.	A greenhouse gas. 20x more effective in trapping heat than CO_2. Annual growth rate is 2%.
Nitrous Oxides (NO_x)	Combustion of fossil fuels and solid waste, agricultural and industrial activity	Destroys ozone and causes acid rain. Increasing at a rate of 0.3% per year and is currently 29% of earth's atmosphere. All cars release approximately 10.7 million tons per year.
Chloroflourocarbons (CFCs)	Refrigerants, solvents, and foam blowing agents	Contributes to the greenhouse effect. Traps heat 20,000x more effectively than CO_2. It is not destroyed or dissolved by an natural substance and is therefore indestructible. One CFC molecule can destroy over 10,000 molecules of ozone. It has an atmospheric growth rate of 5-7% per year.
Carbon Dioxide ($C0_2$)	Combustion of solid waste, fossil fuels (oil, natural gas, and coal), and wood and wood products	Blamed for 50% of all global warming. Levels have risen 25% in the last 150 years, and now compose 0.3% of atmosphere. Rainforest consumes 1-2kg of carbon per square metre per year. A field of crops consumes only $0.5kg/m^2/a$. Annual rate of increase is 0.4% per year, or 10 to the tenth metric tons. Caused by burning fossil fuels. Electrical generation accounts for approximately 35% of all US emissions of CO_2.
Sulphur Dioxide (SO_2)	Produced from burning sulphur-containing coal and smelting sulphur-containing ore	Contributes to smog; combines with water in the atmosphere to form sulphuric acid.

Current Environmental Policy

The university currently has no policy concerning air quality.

Responsible Parties

The Mount Allison community influences air quality in a number of ways. Consumption of fossil fuels for heating and electricity, the wastes sent to landfill and the fuels consumed by university vehicles all contribute to air quality.

Audit

Air quality at Mount Allison is loosely governed by the New Brunswick Clean Air Act, which regulates the amount of potentially harmful gases an individual, corporation, or institution can emit into the air.

After the completion of a Greenhouse Gas Emission Questionnaire[4] a rough estimate of the emissions (in kilograms) produced by Mount Allison in a two year period (1998-2000) was calculated. The gases examined in the survey are carbon dioxide, sulphur dioxide and methane. This questionnaire was created by the Canadian Mortgage and Housing Corporation and was published in the Calgary Herald (Saturday, May 20, 2000)[5]. The questionnaire investigated four different sources of greenhouse gases: buildings, transportation, waste and food. A copy of the questionnaire can be found in Appendix H.

[4]This questionnaire was constructed using information from various other questionnaires and studies.

[5]This questionnaire is only a working version; a final version will be available in the fall of 2000.

Buildings:

Buildings emit greenhouse gases both in the construction stages and in the operation stages. The embodied energy is the energy used to construct the structure, transport building materials and fabricate building materials. The emissions corresponding to this aspect of buildings was calculated using the total square footage of all university buildings. The total emissions from embodied energy on campus is roughly 560 803.62 kg.

The operation of buildings obviously requires a significant amount of electricity and, in our case, heating oil. Electricity bought by the university is derived mainly from hydro, nuclear and thermal sources (refer to figure 11.1 in the energy chapter), all of these energy sources are non-renewable sources (here hydro electricity is considered non-renewable because it is on a macro scale and results in the flooding of vast, mostly forested areas and its consequences on the natural environment: habitat loss, methane emissions from decomposition, loss of carbon sinks; nuclear is not considered renewable because of the amount of waste it produces). Since none of the power supplied to Mount Allison is from renewable energy sources all power supplied to the university results in emissions. The amount of emissions was calculated using the kilowatt hours that appeared on the electricity bills for each building on campus. The resulting emissions are approximately 10 935 752.55 kg.

Oil used to heat buildings is either burnt in the central heating plant or in the individual houses that are off the main campus. The university, in this case, is a direct emitter of harmful greenhouse gases. The emissions resulting from the total oil burnt is 373 193.25 kg.

The total emissions for buildings calculated using this questionnaire amounts to 11 869 749.42 kg. According to the questionnaire, “a typical Canadian household of two adults and two children in a 2,500sq-ft house with one car would score about 27 650kg per yer.”

Transportation:
The university operates ten vehicles in their fleet. Since a new work-order system that requires the logging of mileage has just recently been established there is no exact account of kilometres driven by the fleet vehicles. The auditors were able to tabulate a four month period for three utility vehicles: the electrical van, the plumbing truck and the HVAC truck. These entries were then made into a rough monthly average of 427.83 kilometres. Fuel efficiency was found on the United State's Environmental Protection Agency's fuel efficiency web site (www.fuelefficiency.gov). With fuel efficiency and the rough estimate of mileage it was possible to determine the approximate amount of emissions produced by the operation of the service vehicles on campus. The total emissions calculated for the use of university vehicles is 33 166 kg.

The university operates both hand pushed and ride-on lawn mowers as well as weed-wackers. All of these require gasoline for there operation. The amount of fuel or the fuel efficiency is not known and therefore the emissions from these can not be determined. This manufacture of this equipment also requires a certain amount of embodied energy which could not be determined from this survey.

A significant amount of energy, and therefore emissions, is required to manufacture and distribute vehicles. The embodied energy within a vehicle corresponds directly to the size of the vehicle: the bigger it is the more energy is needed to produce it. The spare parts required by a vehicle are another potential source of embodied energy. The total embodied energy for the university fleet is 3 625 kg.

The total emissions from transportation amounts to 36 791 kilograms.

Waste:
Energy is used to create the items that eventually become part of the solid waste stream. The embodied energy from our solid waste comes from the manufacturing, storing and transportation of the product before it reaches the commercial sector. After the product has served its intended purpose and is discarded more energy is needed to transport, sort and dispose of the item. In addition, wastes in landfills are source of methane gas. Recycled materials are also included in this calculation since they also have embodied energy from the manufacturing process and will also need to be transported to a facility which will further process the items. The total emissions released amounted to approximately 185 775 kilograms.

Food:
In the years following the green revolution, high production agriculture has become a large source of energy consumption. Fuel to run farm equipment; energy required to manufacture chemical fertilizers and herbicides/pesticides; energy, paper, and plastic used to package foods and energy required to process foods all contribute to green-house gas emissions. Food energy obtained from animal sources requires more energy inputs than a vegetarian diet would. Eating local and organic foods also lowers emission levels. Approximately 1 050 people eat in the Sodex'ho Alliance meal hall at Mount Allison, resulting in the release of approximately 1 806 000 kilograms of green house gases since 1998.

According to the calculations made using the Greenhouse Gas Emission Questionnaire, Mount Allison University has emitted a total of 13 889 995.42 kilograms of greenhouse gases between June 1, 1998 and May 31, 2000.

In 1998, the Mount Allison University campus had approximately 955 trees, including three groves of birch and sugar maple. Although these numbers are from two years ago, there have only been a few trees that have been cut down. Trees are a carbon sink and therefore offset some of the emissions produced by Mount Allison. The auditors have no information on the amount of CO_2 absorbed by the trees on campus. The S.A.C. is currently working with the Tree Canada Foundation in developing a tree planting project that would take place on the old university farm property. This project would focus on planting species native to this area.

In 1998 a stack emissions study was started by Facilities Management. The goal of this study was to assess the amount and quality of emission put into the atmosphere while heating the campus with the university's two boilers located in the physical

plant. This study was not completed due to warmer than average temperatures this winter. The study it should be available in the spring of 2001, pending a cold winter this year.

The ventilation systems in the Science, Hart Hall and Fine Arts buildings pump all circulated air to the outside air without any sort of filtration. The systems in both the Fine Arts and Hart Hall buildings discharge their fumes on the ground level. This is not a major problem in the case of Hart Hall since the exit area is removed from high traffic walkways. This is not the case for the Gairdner Fine Arts building where the vents exits on the ground level next to a walkway leading to the library. The ventilation systems in the science buildings discharge their fumes on the roofs of the buildings in question. The fumes collected come from the fume hoods located in the research and teaching labs.

Case Study

"The Tufts Climate Initiative (TCI) was launched in 1998 to steer Tufts University on a cleaner energy path that will enable it to "meet or beat" the target set for the United States under the Kyoto Protocol on global warming."[6] By reducing the amount of emissions produced by the electricity consumed, the university will greatly improve air quality. The Kyoto Protocol signed by the United States says that the government will cut greenhouse gases by 7% of 1990 levels. To meet this commitment the university established a strategic plan which laid the groundwork for the project. The first step in implementing the Climate Initiative was to conduct an inventory of 1990 emission levels to enable them to set the required emissions target. An inventory of the current levels of greenhouse gases was also conducted so that a reduction plan could be established. The decrease in emissions that was established by the two emission inventories was brought about by energy efficient retrofits and the use of alternative energy sources. The reduction of harmful greenhouse gases improves air quality.

[6]http://www.secondnature.org/programs/profiles.nsf/ProfByInst

Recommendations

For Senior Administration:

- Create a section on air quality in the Environmental Policy, complete with performance indicators.
- Commit funds to implementing energy sources which do not create air pollution (e.g wind and solar energy) where economically feasible.

6. Make funds available for the purchase of zero emission vehicles.

For Staff:

7. Establish an emissions reduction target that meets or surpasses Canada's Kyoto Protocol commitments.

8. Continue to restrict the use of automobiles on campus.

9. Implement systems to reduce energy consumption such as those suggested in the energy audit.

For Staff, Faculty and Students:

10. Bike or walk whenever possible.

11. Consider car pooling whenever driving is necessary. Car pooling in pairs travelling 14 km per day reduces emissions by 50% and eliminates 34 kilograms of hydrocarbons, 13.6 kilograms of nitrous oxides, 249.5 kilograms of carbon monoxide and 4490.5 kilograms of carbon dioxide every two weeks.

12. Support the implementation of alternative energy forms which do not

pollute the atmosphere.

13. Reduce energy and heat consumption whenever possible. (See chapter on Energy)

Letter Grade: D

Hazardous Materials

Introduction

In 1999-2000 Mount Allison University disposed of approximately 11 370.25 litres and 1 101.2 kilograms of hazardous waste (for this calculation, "disposed of" encompases waste going out of science stores and waste flowing into the waste water stream). No comparison with the 1998 audit on the amount of hazardous waste can be made because of the nature of the disposal system in place. The wastes are not disposed of at regular intervals, rather, they are disposed of when the quantity is sufficient. A sufficient quantity of a certain type of chemical can occur, for example, once a year or once every three years depending on the rate of use. This makes a comparison between the amount of waste generated in 1998 and the amount generated in either 1999 or 2000 invalid.

Because the sources and volume of hazardous materials being used in an intricate system such as a university are often hard to track, the impact of these materials can be largely unknown and difficult to locate. Although Mount Allison does not use a unified database for the purchasing, storage, and disposal of hazardous materials on campus, there are a number of smaller systems regulating their use, including the Science Stores facility and the individual departments who deal with these chemicals.

Hazardous materials are defined in the United States Compensation Liability Act as "Any substance that, when released into the environment may cause substantial danger to public health, welfare or the environment". This definition was used in the 1998 audit as a means of classifying hazardous materials. A very similar definition is used by Environment Canada and states that "'Hazardous wastes' are those wastes that are potentially hazardous to human health and/or the environment due to their nature and quantity, and that require special handling techniques" (www.ec.gc.ca). Both definitions encompass the materials studied in this chapter.

The sources of hazardous materials at Mount Allison are concentrated in five major areas: science research, fine arts, cleaning materials, materials used in the Facilities Management trades shops, pesticides/herbicides, and other sources. These categories are the same as those studied in the last audit, although further research was conducted in the department of fine arts and in the handling of radioactive materials.

Environmental Significance

According to the World Watch Institute's State of the World 2000 report, "a new chemical substance is discovered about every nine seconds of the working day." Though only 0.5% of these discoveries are released from the lab for commercial use, it is astonishing the number of substances human beings have incorporated into their everyday existence, to the point where life without them seems unimaginable. But the results of this dependency are becoming increasingly apparent in humans and the natural environment alike. Increased incidence of environmental illness[1], cancer, water contamination, depletion of wildlife and the alarming problem of climate change are all due in part to the abundance of hazardous chemicals that have become part of human existence. In fact, as of late it has been discovered that the highest measured exposure to polychlorinated biphenyls (commonly known as PCBs) is among indigenous people in the Northwest Territories, where there is virtually no use made of these toxins.[2] Thus hazardous chemical usage has been identified as yet another practice wherein humans must take into account the full range of impact, not only on their own health and immediate environment, but on

[1] Environmental illness is defined by the EPA as Persons with the diagnostic label of multiple chemical sensitivity are said to suffer multi-system illness as a result of contact with, or proximity to, a spectrum of substances, including airborne agents.

[2] The reason for this exposure is described in State of the World 2000: "One bit of raw whale blubber, an Inuit delicacy...can contain more PCBs than Canadian scientists say should be consumed in a week.".

the health of people and ecosystems around the world. Following this consideration, decisions must be made to reduce or eliminate reliance on these substances accordingly. Some of the most significant hazardous materials, their use, and their effects are contained in Figure 8.1.

Figure 8.1

Chemical	Use	Effects
PCBs	Found in paints, dyes, copy paper heat transfer fluids and lubricants.	Highly toxic and carcinogenic
Dioxins	A family of chemicals used in lawn care, agriculture and forest management. It is also produced as run-off from pulp and paper mills, and is created in the combustion of PCBs.	A defoliant and mutagen.
SO_2	Produced through the burning of fossil fuels.	Causes chlorophyll loss at concentrations as low as 2ppm. Cereal crops are damaged at levels less than 50 ppm and pine trees cannot survive when annual concentrations exceed 0.07-0.08 ppm.
Ethylene	Found in many cleaning agents.	Causes injury to flowers and plant life.
Fluorides	This group of chemicals is emitted by metal refineries and fertilizers.	Damage to fruit trees: every increase of 50 ppm of atmospheric fluoride levels decreases the average yield of a fruit tree by 27%

Current Environmental Policy

"Under this policy, the university will endeavour, through the Fine Arts and Safety Committee, to limit the use of Hazardous Materials as follows:

- Pesticides are used on campus only when required
- Micro-scale laboratories are used
- Effective, environmentally friendly cleaning supplies are used
- The transportation of all hazardous materials is monitored." (Section 2.3, Mount Allison University Environmental Policy, www.mta.ca/environment)

Science Research

Responsible Parties

Chemicals used in the university labs are ordered by professors on an individual basis, however, the chemistry department is generally considered central in possession of chemicals as it houses the Science Stores facility, which is directed by Roger Smith.

Audit

As was mentioned in the last audit, third and fourth year laboratories are done using micro scale chemistry whenever possible. Micro scale work reduces cost and toxic waste by using chemicals in minute quantities. Micro scale lab experiments have also been implemented in the first and second year Chemistry courses.

The Science Stores is a centralized service that provides chemicals and coordinates the disposal of hazardous wastes on campus. This facility is located on the ground floor of the Barclay building. Science Stores makes use of a database into which all departmental and research purchase orders are compiled. Certain departments on campus, including physics and fine arts, obtain small quantities of chemicals from the chemistry department. These include such chemicals as alcohol and ethanol, both used to clean equipment. It was generally felt that the creation of an interdepartmental chemical exchange board or database, as recommended in the 1998 Audit (p.30) would not be necessary as the majority of purchasing takes place within Science Stores and because faculty tend to purchase materials only as they are needed in the quantities required. The Director of Science Stores did inform the auditors that when unused portions of hazardous materials were returned they were recorded and placed on the store's shelves, thereby making them available to faculty and researchers for further use.

In terms of disposal, hazardous chemicals are returned to Science Stores. Upon return, chemicals are separated according to content under the Lab Pack[3] categories and stored in large containers on site in the Barclay Building. When sufficient waste has been accumulated in the facility, Laidlaw Environmental Services Ltd. transports it to their facility at Debert, Nova Scotia. Between May 1999 and April 2000 Mount Allison sent 3 229.2 litres of hazardous materials to this facility (for a breakdown of disposal, refer to Appendix I) This volume has more than doubled since the time of the last audit, an increase that can likely be attributed to the cleaning out of the PEG prior to this summer's renovations, the need to clean out the labs belonging to retired or departed researchers and the possibility that more lab packs happened to reach capacity in this period. In the past there has been a problem when researchers in the sciences leave the university and fail to properly clean out their lab space, leaving behind unidentifiable wastes that are much more difficult and costly to dispose of simply because they cannot be dealt with as wastes in known Lab Pack categories can. The auditors were informed that as a result of stricter regulations and wider awareness among faculty, this problem has gradually decreased as of late[4].

Science Stores is licensed by the provincial government as a hazardous waste generator and is audited by them for compliance with environmental regulations.

Radioactive materials on campus are currently regulated by Dr. Ralf Brüening in the

[3] A lab pack is "a recognized packaging unit of the U.S. Department of Transportation...that allows different chemicals from the same hazard class to be packaged together in specified containers for treatment and disposal." (Kaufman, p.169)

[4] Information obtained through an interview with Roger Smith, manager of Science Stores and Dr. John Read of the Chemistry Department, May 2000.

Physics Department and are licensed through the Atomic Energy Control Board[5] (the license can be found in Appendix J). Use of this material is limited to the Barclay, Flemington and P.E.G. buildings, and a research lab in St. Andrews, New Brunswick. Because of the shift away from research using radioactive materials, and because the material is quite expensive, when used in the classroom, all labs are done in micro-scale. What little radioactive materials that are currently purchased are funded through the operating budgets of the individual departments or specific research grants.

There are two categories of radioactive materials used in the Physics Department: those that are covered under the Atomic Energy Control Board License and those that do not require a license. As research shifts away from radioactive materials in the Physics Department, very little material of either category is being purchased, used, or disposed of. According to department faculty, only a few sources were purchased for teaching and these particular sources did not require a license. What little material is possessed by the department is labelled and stored in a refrigerator. The most recent inventory of radioactive materials possessed by the department is contained in Appendix K. Because radioactive materials are only useful when still radioactive, for material to be considered waste (ie. not useful in experimenting for radioactivity) it must be neutral and thus is not considered radioactive waste by disposal companies. When the Physics Department tried to dispose of their radioactive waste recently, they were told to dispose of it as they would any other garbage on campus. As of yet, the department is still storing this material until an alternative method of disposal is found. As a general statement, the handling, and disposal of radioactive material in this department is as per Atomic Energy Control Board (AECB) regulations.

There are no radioactive materials used by the Chemistry department, although the Barclay building is licenced to accommodate Biochemistry research which uses some radioactive materials.

As per the general trend noted in the Physics and Chemistry departments, the Biology department is no longer using much radioactive material in its research labs. What little is still contained in the department tends to be devoted to teaching, although some is still used for research. Carbon 14 and Tritium are the main radioactive elements currently being used. The department houses a refrigerator for storing these elements. Wastes are disposed of in two ways: gases are vented out of the fume hood and liquid wastes are evaporated and disposed of in the garbage. This is as per the AECB license for neutral radioactive waste.

Science Research Recommendations

For Faculty:

1. Continue to meet regulations for purchasing, using, disposing of hazardous materials. Consider exceeding regulations for the sake of environmental safety beyond human health.

2. Establish and maintain a comprehensive inventory of radioactive materials in all departments.

3. Consult Science Stores before purchasing hazardous materials to avoid overlap.

4. Ensure proper labelling of all hazardous chemicals in labs so as to avoid unknowns in the disposal procedure.

5. Take all first year students on a tour of the chemical disposal site and identify procedures at Mount Allison, to increase awareness of responsible disposal methods and hazards.

6. Educate students on the effects of toxic laboratory chemicals on wildlife and their larger environmental impacts when they are poured down the drain, both in teaching and through signs posted in the labs.

7. Continue to prepare laboratory assignments in groups of two or more, when feasible, to reduce chemical wastage.

8. When feasible utilize micro-scale lab techniquess in the laboratory portion of classes.

For Students:

9. Use proper disposal methods when dealing with any chemical waste.

[5] Mount Allison's Atomic Energy Control Board license was due to expire on January 31, 1999 but was extended without amendments to January 31, 2001. A copy of the letter from the AECB and the original license can be found in Appendix J.

10. For senior research students, consult Science Stores when ordering chemicals to avoid overlap.

Fine Arts

Responsible Parties

Thaddeus Holownia, head of the Fine Arts department, is responsible for the purchase of chemicals for the photography lab. Paul Griffin, the photography technician, is responsible for the mixing and storing of all photo chemicals. Dan Steeves is responsible for the ordering, storage and disposal of the chemicals used in the printmaking facilities.

Audit

Photography

Disposal of all hazardous waste, except selenium toner, from the photography department is done by flushing the spent chemical into the wastewater stream without treatment. The selenium toner is collected throughout the year and is disposed of by Science Stores when the quantity is sufficient.

Although fixer has notable silver content it continues to be flushed down the drain with the other chemicals, despite the department's plan to rectify this infraction of American environmental regulations two years ago. The town of Sackville does not have a by-law specific to silver, although it does have a by-law concerning the disposal of contaminants which states: "no person shall discharge water or wastes containing cyanides, chromium, cadmium, copper, or sulfides; or containing a toxic or poisonous substance in sufficient quantity to infure or interfere with any sewage treatment or constitute a hazard to humans or animals." Silver is not considered a toxic or poisonous substance in this by-law. The Head of Fine Arts is currently looking into initiating a silver recovery program for the photography department.

Figure 8.2 Quantities of Chemicals used in Photo lab (May 1998 to May 2000)

Product	Quantity
TMax RS developer	**304 litres**
Dektol Developer	**1140 litres**
Rapid Fix	**1710 litres**
Hypoclearing Agent	**76 litres**
Rapid Selenium Toner	**19 litres**
Flexicolor Developing Kit	**19 litres kit**
E-6 Developing Kit	**30.4 litres**

Printmaking and Lithography

The printmaking studio uses numerous different types of chemicals, most of which are hazardous both to the human body and to the natural environment (a complete list of chemicals used by the printmaking department can be found in Appendix L). Varsol is now being used as a cleaning agent instead of lithotine, which is a more volatile and expensive chemical. The Varsol is recycled into a machine parts washer and is used until it is no longer useful for cleaning. When no loner useful, the Varsol is stored until a sufficient amount can be disposed of through Science Stores. A small amount of Varsol is lost through evaporation during its use. The facility uses two 45 gallon drums of Varsol in a year.

Various types and concentrations of acids are use in the printmaking process. Most acids are diluted to a 10:1 concentration, but some solution are more concentrated depending on the intended use and the desired result. All acids are neutralized with sodium bicarbonate before being poured into a marble vat where it is further neutralized before being disposed of into the wastewater stream. All acids go through this procedure when they are handled by the staff. Students, on the other

hand, do not always comply with the proper disposal methods, though there is no way of measuring this variable.

A rag service is provided by the Canadian Linen company for approximately $400 a year. The service picks up dirty rags in exchange for clean ones. The dirty rags are then taken to their facilities to be washed. This procedure is as per the chapter on Health and Safety in "Impressions: A Canadian Printmaker's Handbook" which states: "Large commercial laundries are required to have a pre-treatment system which collects contaminants from the rags before the wash water goes into the municipal sewage treatment plant." (Krickhan and McGuigan, p.67)

The staff associated with the printmaking lab have done their best to provide students with the knowledge and equipment for the safe use and disposal of hazardous waste, they have also actively sought out alternatives for the most toxic substances used.

Case Studies

The University of Alberta's printmaking studio actively seeks out less hazardous alternatives to the chemicals they currently use. The department has significantly cut down on the amount of solvents (Varsol) used by changing to Ecoloclean products where possible. The amount of acids produced by the department has also diminished due to the use of ferric chloride for an etchant instead of various acids. A Chemical Recycling program has been in place on the campus for approximately the past 10years. This program acts as a vehicle for the exchanges of chemicals. Chemicals that are no longer needed within a department can be taken to the program's storage site and is made available to the rest of the university community.

In past years the department had a holding tank into which all of the sinks in the facility drained. The waste was stored in the tank until a sufficient amount was collected. The tank was then emptied by the University Hazardous Disposal Team. The chemicals were subsequently disposed of at hazardous waste facilities, either in an incinerator or a deep disposal well. This method of disposal is no longer practised since the amount of hazardous waste has been reduced by a significant amount and the Chemical Recycling program has been initiated.

The disposal of hazardous waste at the University of Alberta adheres to the regulations set forth by the government. At the same time, the department has taken it upon themselves to reduce their use of hazardous chemicals overall. "We believe the best way to dispose of hazardous chemicals is to reduce the active use of them in the first place and we are always looking at non-toxic alternatives."

Fine Arts Recommendations

For Senior Administration:

11. Make funds available for a silver recovery program on campus.

Faculty:

12. Conduct workshops for staff, students and faculty teaching them methods for establishing an environmentally sensitive studio.

13. Reuse, recycle and share chemicals whenever possible.

14. Continue to seek out less hazardous alternatives to chemicals used in Fine Arts, where feasible.

15. Develop a proposal for the administration outlining what would be required to establish a silver recovery program on campus.

For Students:

16. Learn proper disposal methods of chemicals.

17. Encourage safe disposal of chemicals amongst fellow students.

Herbicides and Pesticides

Responsible Parties

The maintenance of Mount Allison grounds is the responsibility of the Grounds Superintendent who is assisted by approximately 11 full time grounds staff. Outdoor pesticide application is the responsibility of the pesticide company granted the contract for a given session. Indoor pest control is the responsibility of the Custodial Supervisor and the custodial staff. Its application is the responsibility of a company contracted by the university.

Audit

Pesticide use at Mount Allison has fluctuated over the last two decades. Between 1983 and 1994, the university ceased all applications of fertilization and pesticides, as a result of improper application of a broadleaf herbicide and poor equipment. When spraying resumed it was through a licensed landscaping company contracted by the university. Between 1994 and 1997, a complete spraying program was practised. This involved two applications of fertilizer, insecticide, and herbicide which cost approximately $8000 per year. The company contracted to apply these materials varied, depending on the bids received each year.

Since the publication of Rachel Carson's book Silent Spring in 1962, there has been a gradual rise in public resistence to pesticides. The government of New-Brunswick`s House of Commons Environment Committee has recently published a report on the use of pesticides in the province. One recommendation put forth by the report is a five year plan to phase out and eventually ban the cosmetic use of pesticides in the province. Here at Mount Allison, some members of the university community have taken up this cause and are pushing for a ban on campus pesticide use. In response to this pressure, a reduced spraying program began in the summer of 1998 and continues today. This program involves a single application of herbicide. In response to the question: "Do you support the spraying of the campus with herbicides in order to maintain a weed free campus" in the Environmental Audit Campus Questionnaire, 97 of 119 respondents answered no.

The reduced spraying program is significantly cheaper, costing the university approximately $4000, a savings of 50%. It is understood that under this program, insecticide will be applied only if cinch bugs (burrowing insects which damage grass root structure) are sighted, and has not been applied since 1997. Though the reduced spraying program represents a willingness on the part of the university to acknowledge the environmental and health risks involved in pesticide use, many members of the university and local community would like to see a complete ban of these materials on the Mount Allison campus. This desire has been heightened by the recent decision by the municipality of Halifax, Nova Scotia to instill a ban on landscape pesticides throughout the city. However, pesticides are, at this point, considered to be the only financially feasible means of ensuring the healthy looking grounds which are generally perceived to be a direct reflection of a healthy university. The Grounds Supervisor informed the auditors that the increased maintenance and watering that was required to keep a pesticide-free campus aesthetically healthy and safe (for liability reasons) would cost the university approximately $30 000 in labour. Spot spraying was also suggested as a method of further reducing the amount of herbicides used. This would involve spraying only those areas that received extensive traffic and/or where grass was weakening. However, this was not selected as it was predicted to be less cost-effective and thought to pose more of an inconvenience to the university community overall because it could not be done in one weekend the way a general spraying can. Nonetheless, the Grounds Supervisor continues to research alternatives to chemical herbicides, including one fungus-based product that should be available in the next two years, as was mentioned in the last audit (p. 37).

The spraying program for 2000, included one application of a set of three herbicides, the same as those sprayed in 1998 and 1999, as well as one application of granular fertilizer See figure 8.3 for full ingredient list.

Figure 8.3

Herbicide	Chemical Components
Mecoprop:	2-(4-chloro-2-methylphenoxy)-popanoic acid
Dicamba:	3,6-Dichloro-2-methoxybenzoic acid
2,4-D:	(2,4-Dichlorophenoxy) acetic acid
Fertilizer	**Chemical Components**
28% nitrogen fertilizer: urea(in granular form):	NH2-CO-NH2

Indoor pesticides are used to exterminate insects and rodents within buildings.

Between 1997 and 1999, 3732 grams, plus 2 litres of indoor pesticides were used at Mount Allison. These products were used to combat a variety of insects. A complete description of spraying for these years is contained in Appendix M.

Case Studies

The University of Waterloo's campus is comparable to Mount Allison's in terms of the high percentage of land covered by turf, shrubs, and trees. Like Mount Allison, they have taken a phased approach to reducing pesticide/herbicide use on their grounds. Their WATGreen website notes that "The landscaping practices at University of Waterloo have changed. Instead of 350 acres being sprayed with chemicals at least twice a year and often four times, there has been a gradual reduction of pesticide spraying. For general turf area, the target is 0% pesticide use (exceptions for infestations and hard surface maintenance). For sports turf, spot spraying is done only as required to maintain safe playing conditions. Also 10% of the campus is now naturalized landscape instead of grass. The WATgreen Task Force on Turf Grass Maintenance was established to investigate the options and alternatives to turf grass maintenance. The result was the Turf Grass Maintenance Action Plan, held in Plant Operations, which includes a target of 0 pesticides by the year 2000." By transforming a portion of the campus from turf to naturalized landscape, the university eliminated the maintenance that is necessary for non-native species in a particular bioregion. By erecting a task force on grass maintenance, the university can "institutionalize environmental stewardship efforts and bring stakeholders to the table"(Creighton, p.21) with a more specific focus than is contained in a general environmental steering committee.

Herbicides and Pesticides Recommendations

For Senior Administration:

18. Make funds available for increased upkeep of grounds and/or alternatives to pesticides/herbicides.

19. Research alternatives to turf, such as native species of grass, moss, mulch, or vines.

20. Lift any pressure on the grounds maintenance staff to keep the campus completely weed free.

21. Ban pesticide and herbicide use everywhere on university grounds excluding the main athletic fields.

22. Notify university and local community as to spraying schedule at least one week in advance.

For Staff:

23. Experiment by setting aside a patch of lawn to keep pesticide/herbicide free. Use this to measure the potential result of a ban.

24. Continue to actively investigate organic alternatives for lawn care; look into the possibility of corn gluten, fungus based and other alternatives.

25. If Mount Allison does make the switch to chemical free grounds, make sure that people know about it through articles in "The Tribune", "Times and Transcript", "The Argosy" and through signs that read "This lawn is pesticide and herbicide free".

26. Consider environmental impacts when selecting a pesticide/herbicide contractor, during the phase out process.

For Faculty and Students:

27. Educate yourself on the issues surrounding pesticide/herbicide spraying, considering what defines a healthy lawn or healthy campus.

28. Do not spray your own lawns with chemicals and educate those around you who do.

Cleaning Materials

Responsible Parties

Cleaning materials are purchased by two departments: Facilities Management and Sodex'ho Alliance. In Facilities Management this purchasing is the responsibility of the Custodial Supervisor. At Sodex'ho Alliance, these supplies are purchased through the director of Sodex'ho Alliance on the Mount Allison campus.

Audit

In the past year (May 1999-May 2000), 6 081.45 litres and 1 100.8 kilograms of cleaning products requiring Materials Safety Data Sheets were used by Facilities Management, mainly for Custodial Services. Materials Safety Data Sheets, more commonly known as MSDS, are required for all products containing ingredients hazardous to human health and requiring specific handling and disposal procedures. The MSDS information for all products purchased by the department is kept in a labelled binder at the MSDS Centre in Facilities Management and is updated by the Senior Supervisor of Custodial Services. A list of these products, the supplier, use and toxicology data is contained in Appendix N. Custodial services is open to trying new products and making changes to the list of products purchased by the department. The Senior Supervisor buys on the basis of both effectiveness and chemical content, striving to find products that contain as few hazardous materials as possible without making a job more time consuming for staff. Products are added or dropped from orders based on the level of satisfaction reported by staff. While Envirosolutions (sold by Swish) products were included as a Case Study in the Cleaning Materials chapter of the last audit, these products were tested by the custodial staff at Mount Allison and found to be less efficient. However, the department remains willing to test other environmentally friendly alternatives.

At Sodex'ho Alliance, all cleaning supplies are purchased from Ecolab, under a national contract. The auditors were informed by the Sodex'ho Alliance manager at Mount Allison that Ecolab products are all biodegradable and thus do not require any specific disposal methods. Ecolab has a list of environmental principles that are posted on the company website. For a complete list of the cleaning products used by Sodex'ho Alliance at Mount Allison, refer of Appendix O. Unfortunately, the manager failed to provide the auditors with accurate estimates on the volume of cleaners used annually.

Cleaning Materials Recommendations

For Staff:

29. Ensure that M.S.D.S. centers are kept up to date, including information on all hazardous products in use on campus.

30. Request full disclosure for all products and procedures from contracted cleaning supply companies, and companies contracted to do cleaning work on campus.

31. Purchase cleaning materials based on environmental indicators beyond human health.

32. Support the use of nontoxic and biodegradable options in cleaning methods whenever possible.

33. For Sodex'ho Alliance, keep an accurate inventory of the volumes of cleaning products used in food services.

Shop Chemicals

Responsible Parties

Wendell Richards, the trades supervisor at the university's Carpentry shop is responsible for the purchasing, storage, and disposal of all hazardous materials used by shop staff. Perry Eldridge is responsible for the Plumbing shop and the hazardous chemicals in it.

Audit

At the time of the last audit, materials for the Carpentry shop were purchased on a monthly basis. This system has since been replaced by one wherein materials are purchased as the need arises. No inventory of products is currently kept by the shop. The main sources of hazardous material in the shop are paints, varnish, solvents, batteries, and various adhesives (see Appendix P). Of the paints currently in stock, approximately 75 per cent are water based. Approximately 50 per cent of all stains are water based. When possible, new paint purchased by the shop is water based. There is a financial incentive to choose water-based paints as they are less expensive than the oil based alternatives. Paint is stored until it dries out and everyone in the shop makes use of the same supplies, thus preventing unnecessary waste. The shop has investigated water based alternatives to traditional contact cement and other adhesives but found that these products cost twice as much and were not as effective. With the exception of the batteries used for drills, batteries used by the shop are not rechargeable. There are two main methods of disposal from the shop. Batteries and flourescent lights (which contain acid) are clearly labelled and disposed of with the regular garbage. Other materials including paints, Varsol, varnish, adhesives and contact cement are collected and at the end of the fiscal year they are transported to the Westmorland-Albert waste facility.

The Plumbing shop makes use of two chemicals. In the past two years the university plumbers utilized approximately 16 kilograms of 222 (Sewer Line and Drain Cleaner), this product is very toxic and therefore used only when there is no other alternative available. For regular plumbing maintenance, Scram, a sulfuric acid drain cleaner, is used. Roughly 288 litres of Scram were used in the last two years. Super Ream 2 was used prior to Scram but is no longer being used due to health concerns raised by the plumbers. Both chemicals used have M.S.D.S. sheets, the toxicology information given on these refers to both chemicals as slight eye, skin, respiratory tract irritants, Scram can also cause severe chemical burns.

Shop Chemicals Recommendations

For Staff:

34. Request full disclosure of procedures from all companies supplying toxic substances to the Mount Allison community. Divest from those companies with violations of environmental regulations.

35. Keep a complete inventory of all items purchased for the Shop.

Other Sources of Hazardous Waste

The photocopiers on campus use toner cartridges and fuser lubricant that contain some hazardous materials. The fuser lubricant used by the machines consists of Polydimethylsiloxane. The toner cartridges contain Styrene/butadiene copolymer, steel powder, iron oxide and carbon. While these substances are classified as hazardous according to the Material Safety Data Sheets, none of them are particularly dangerous; the most serious threat posed by these materials is minor respiratory irritation. All chemicals are used up in the photocopy process and the empty cartridges are sent to a recycling company where they are either re-filled or disposed of.

The Owens Art Gallery uses approximately 189.5 litres of latex paint each year when repainting the walls for various shows. Paint is kept by the gallery until it is completely used.

There are currently 42 full size refrigerators on campus and every year residents bring mini fridges for personal use. As old refrigerators are replaced or left behind by students, the university collects them and pays $50.00 for the reclamation of the refrigerant (CFCs), thereby diverting them from the waste stream. There are no figures for the quantity of these products used by residents and there are no regulations relating to what can or cannot be brought onto residence property, apart from conventionally forbidden drugs. Batteries containing mercury cause damage to fish and aquatic ecology when released. However, they are rarely recycled by students. Rechargeable batteries are available at various retail outlets in Sackville, and other batteries can be dropped off at Wheatons to recycle their mercury.

The pool in the Athletic Centre utilizes approximately 4 344.6 litres and 901 kilograms of chemicals during a two year period. For information regarding the types and quantities of chemicals used in the Athletic Centre pool refer to Appendix Q. Various alternatives to the chemicals used can be found and have been used quite frequently in the past. Some of these alternatives included ozone, ionizers and magnets. Information on these and other alternatives can be found at www.enviro.org.

Hazardous materials are sometimes brought in by contractors and used for various maintenance work around campus. The university does not currently track the use of these chemicals or their respective disposal procedures.

Other Sources Recommendations

For Senior Administration:

36. Establish regulations limiting the quantity and type of products with hazardous materials that residents are permitted to bring onto campus.
37. Request a $50 deposit for any mini fridges that are brought onto campus to ensure their removal.

38. Continue to recycle Freon from all fridges on campus.

For Staff:

39. Request full disclosure on hazardous materials used by companies contracted to do work on the campus. Consider including a request for less hazardous alternatives to these materials in work conracts.

Students:

40. Use the fridges in residence kitchens, instead of mini-fridges installed in each residence room.

41. Request information on the chemical ingredients of products that you purchase. Avoid products with toxic components and any companies refusing to provide ingredient disclosure.

General Recommendation

For Senior Administration:

42. Ensure that a consolidated system of monitoring the purchase, use, and disposal of hazardous materials at Mount Allison University is established.

Figure 8.4 Review of Current Environmental Policy

Current Performance Indicator	Current State of Affairs	Proposed Change to Performance Indicator
Pesticides are used on campus only when required	One application of herbicides is applied each year, pesticides are used only if pests are sited. Spraying is limited to problem areas.	The term 'required' should be backed with further definition and specifications as to areas and types of pesticide permitted on campus.
Micro-scale laboratories are used	The micro-scale method is increasingly being implemented at this university, especially in first-year chemistry laboratories.	No change proposed.
Effective, environmentally friendly cleaning supplies are used.	Cleaning supplies tend not to be purchased with price foremost in mind. Human health is the primary factor in purchasing.	Change policy to encourage custodial staff to evaluate cleaning products based on a broader environmental impact, beyond human health.
The transportation of all hazardous materials is monitored.	Hazardous materials are monitored in a series of smaller systems, including the Fine Arts department and Science Stores. A university-wide monitoring database has not yet been established.	A target date should be set for the implementation of a university-wide monitoring system to track the transportation of hazardous materials to and from the university.

Letter Grade: D

Solid Waste

Introduction

In the past year Mount Allison sent 305.7 tonnes[1] of garbage to landfill. This shows an increase of between 30 and 80 tonnes[2]. There are still many areas where this volume could be further reduced. The auditors found that many members of the university community do not know what and where to recycle on this campus. The number of recycling containers on campus is inadequate, both within buildings, and on the grounds. Remedying both these problems may in future reduce the amount of recyclable material going to landfill each year. At the same time it is very important that the university take into account the other two R's: reduce and reuse. These concepts are examined throughout the audit when discussing purchasing and use of various resources both natural and otherwise.

[1]This figure calculated using total loads sent to fill in that period multiplied by the average weight of a load of garbage, as weighed by grounds staff in April 1998.

[2]There is a discrepancy between the volume of garbage listed in the 1998 audit which states 224 tonnes, and the figures contained in a report produced by the Grounds Manager in April 1998 which states 269.87 tonnes.

Environmental Significance

Solid waste operates on a direct input-output relationship, simply meaning that a percentage of what is produced and consumed is present in landfills. In recognizing this direct relationship, human beings worldwide are gradually coming to understand that the solution to overflowing landfills is not more landfills, but a drastic change both in the level of consumption and the means of disposal. The three R's approach has, in the last decade, become the most popular solution to both consumption and disposal, the three R's being Reduce, Reuse, and Recycle. Most likely because it demands the least in terms of personal lifestyle change, recycle quickly became the most preferred of the three R's. When given the option to either a) **reduce** their consumption of a beverage bought in a disposable container altogether, b) purchase a beverage in a **reusable** container (glass or plastic as opposed to cardboard or aluminum), or c) deposit the beverage container in a **recycling** bin in handy proximity to the traditional garbage can, most people have selected c) as being the easiest of the three. But at the current rate of consumption, extensive energy is required to operate recycling facilities. For this reason, and because more of the world's resources are rapidly being depleted each day that recycling is selected over reducing and reusing, it is vital that we reassess our approach to solid waste management to achieve a rate of consumption that is more sustainable.

Current Environmental Policy

"The University will endeavour, under the supervision of the Department of Facilities Management, to minimize solid waste production."

The performance indicators for this section are as follows:

- "Solid waste generated by the university is limited.
- There is an effective paper waste reduction program.
- An effective recycling program is maintained across campus.
- Yard waste is used as mulch on campus grounds
- Furniture is offered for sale or donation prior to disposal." (Section 2.6, Mount Allison University Environmental Policy, www.mta/ca/environment)

Responsible Parties

The custodial and grounds staff and their respective supervisors, working within the operations of Facilities Management, are responsible for the collection and disposal of solid waste at Mount Allison.

Audit

At Mount Allison, solid waste falls into two categories: material sent to landfill, and material which is recycled.

Material Sent to Landfill

Between September 1998 and September 1999, approximately 305.7 tonnes of garbage were transported to landfill. The 1998 audit reported 224 tonnes, although the report prepared by the Grounds Supervisor shows 269.87tonnes as the total for that year. The significant increase in loads removed from the university since the time of the last audit could be due in part to the decision to transport all waste from construction jobs with university vehicles as opposed to contracting a sanitation company to move the waste. This decision was made for financial reasons. There may also be a discrepancy between how full different grounds staff fill the truck before transporting it from the campus. If a truck is not filled to capacity, more loads are transported overall[3].

Solid waste sent to landfill is transferred from individual garbage cans in buildings and on the grounds to central locations by the custodial and grounds staff. Following this, it is collected from these sites and transported by the school grounds vehicles to the Tantramar Sanitation facility. Tantramar Sanitation then transports the waste to the landfill at Westmorland-Albert**,** a solid waste facility outside Moncton. Apart from landfill, the scrap wood produced by the Trades Shop in building and grounds repairs is burned off site. Currently, the grounds department at Mount Allison sends yard waste-grass clippings, leaves, and branches-to landfill. This material should be composted and/or turned into mulch to be reused in landscaping as stipulated by the policy.

As furniture wears out or is deemed unsuitable for use in the university buildings, it is replaced. Decisions on what pieces to replace are made by the Facilities Requirements Manager. Some items are stored for future or short term use on campus, while most things are sold at a yearly sale coordinated by the Purchasing Manager.

The amount of waste produced in food services has greatly decreased as a result of the renovations to Jennings Hall. Combining two meal halls into one facility means less food is thrown out. This waste continues to be sent to a nearby pig farm for slop. This amount could be further reduced if students took only as much food as they needed. The director has no objections to posting signs reminding students to do so.

At Sodex'ho Alliance, much waste is produced from packaging. The director informed the auditors that products are purchased in bulk wherever possible. While this is primarily a financial consideration, it does help reduce the amount of packaging per volume of food. In addition, many products that were once packaged in boxes are now packaged in bags, which has in turn decreased the amount of waste produced. Upon encouragement from various students, the director has purchased cream and sugar dispensers to replace the individual packages used in the past. These will be available at both Jennings and the Golden A Cafe in September. China and stainless steel cutlery make the amount of solid waste produced considerably lower than it might be. Currently, food services uses disposables in the Golden A Café, for catering conferences, at outdoor events, in emergencies, and for sick trays and bag lunches. In the past two years since the last audit, approximately 25 500 styrofoam cups, 6 000 paper plates, and 4 500 pieces of plastic cutlery have been used in the Golden A Café. Approximately 66 000 styrofoam cups, 66 000 paper plates, and 88 000 pieces of plastic cutlery were used for all other events during this period. The director of Sodex'ho Marriot informed the auditors that meal hall staff would be willing to put food in reusable containers for sick trays if students provided their own, but that is becuase it would be difficult to monitor return of the containers, the facility would not supply them. The meal hall already loses a substantial amount of china and cutlery each year to theft and breakage. Disposables are currently used in the Golden A Café because the dishwasher in the cafe does not have the capacity to wash the number of dishes produced each day, and because it is feared that the lay-out of the room makes it hard to prevent theft. However, the cafe does offer a discount to those who bring their own coffee mug. Of 60 respondents to the Environmental Audit Campus Questionnaire question: "Do you support the use of reusable containers, and/or reduced packaging overall in food services on this campus", 59 answered yes.

It was recommended in the last audit that food services consider switching to recycled napkins. As of yet, Sodex'ho Alliance continues to purchase "White Swan"

[3] Information on loads sent to fill obtained in a phone interview with Grounds Manager Debby Wynberg, July 11, 2000.

napkins from Scott, made with 100% virgin fibre. The auditors were informed that white napkins are purchased for aesthetic purposes, but that with sufficient student support, the director would consider switching to recycled napkins. Overall, the number of napkins used has decreased from 1.5 cases to 1 case per day since the opening of the new Jennings. This is likely the result of the individual napkin baskets placed in each table in the new facility, replacing the dispensers that were once located at the entrance to the meal hall.

Recycling

The university first began separating out recyclable materials in 1989. This began as a student initiative, but was institutionalized in 1994 and made the responsibility of the custodial and grounds staff in terms of containers, collection, and transportation from the campus through contracted recycling facilities. The scope of the program remains virtually unchanged since its beginnings, with paper products and beverage containers being the two types of materials recycled by the university. Currently, paper is sent to the Dorchester Penitentiary where it is shredded and used as animal bedding. This began in September 1998, prior to which time paper was picked up by Ergon. Between September 1998 and September 1999 approximately 3 238 bags of paper were sent to the Penitentiary. For the past two years, beverage containers have been recycled by Wheatons, although this was done by Valley Glass for five years prior. The Wheatons depot located at the Industrial Park in Sackville accepts both glass and plastic containers (for information on the quantity of beverage containers recycled from October 1998 to April 2000, refer to Appendix R). The collection of both paper and beverage containers is similar to the collection of waste destined for landfill. Individuals deposit their recyclables into the appropriate bins on their floor or building, after which custodial and/or grounds staff transfer the material to central locations. In the case of paper, material is collected in a room on the ground floor of Harper Hall

In food services, recycling has changed little since the last audit. Paper products are recycled wherever feasible. Cardboard cannot be recycled as it requires too much space to store on site. A cardboard baler would minimize the amount of space required to store boxes. Cans are not recycled because rinsing them would require additional labour and wages, which the company cannot afford at this time.

Despite the relatively long history of recycling at Mount Allison, participation in the program remains quite low. When conducting an examination of the composition in a days worth of garbage from Centennial Hall, the auditors found it contained approximately 50% recyclables and 50% waste[4]. The study done by Amelia Clarke in November 1994 showed 52% recyclables on average. These figures, show virtually no change in the level of recycling taking place on this campus[5]. In the Environmental Audit Campus Questionnaire sent to all members of the university community, 56% of those who responded answered no to the question "Do you feel you have an adequate understanding of recycling on this campus?" Although the recycling system on campus has changed little since 1994, there appears to be a lack of understanding within the university community which may be contributing to a lack of participation.

As was predicted in the last audit, the municipality of Sackville recently (1999) switched to the Wet-Dry system introduced by Westmorland-Albert Solid Waste Corporation. Some of the confusion associated with recycling on the university campus may have to do with the implementation of a system that is incongruent with the university's. As of yet, Westmorland-Albert is not accepting waste from institutions, although they plan to phase this in over the next year[6]. The Custodial Supervisor is currently researching the logistics of implementing the program when the phase-in begins.

The Wet-Dry garbage separation system is a simple measure used to divert the maximum amount of solid waste from landfill. The basis for the proper working of the system is public participation. Garbage in the home is separated into a blue bag (for the dry garbage) and a green bag (for the wet garbage). The garbage is then picked up by the municipality at curb side and transported to the Westmorland-Albert facility. When the garbage arrives on the site it is separated into its respective pile. The Dry garbage goes through a series of sorting stations where recyclables such as paper, plastics, metal and cardboard are removed (the facility will remove and sell any recyclable for which there is a market). The garbage that is not separated for recycling is sent to landfill. The Wet garbage is mechanically sorted to

[4] This percentage was obtained from a composition study of a day's worth of garbage produced by Centennial Hall in May, 2000. This building was selected as one of the buildings on campus that runs closest to the typical September-April capacity in the summer months.

[5] Amelia Clarke's figures were referred to in the 1998 Audit and assumed to be relatively accurate at that time as the recycling system had changed little since then.

[6] Information obtained through a telephone interview with Marc Ducette, public relations at Westmorland-Albert. May 2000.

remove all that is not compostable (this is done by sifting the waste, the smaller bits of garbage are sent to be composted). The compostable materials are then sent to long horizontal silos where they will become compost over time. The garbage that is not sent to the compost silos is diverted to landfill. The sorting of the garbage into Wet and Dry is done as shown in figure 9.1.

Figure 9.1

Wet Garbage- Green Bag	Dry Garbage- Blue Bag	
-food scraps -animal waste -sawdust -ashes -bandages -feminine hygiene products -lint -plants -serviettes -vacuum cleaner waste -paper towels -facial tissues	-aluminum cans -pie plates -foil paper -plastic bags -binders -books -glass/metal/ plastic -bottles -cardboard -bubble packaging -cereal box liners -clothes -coat hangers -drink boxes -deodorant -combs -computer discs -audio/video cassettes -egg cartons -frozen juice containers -furniture -leather	-magazines -milk cartons -overheads -packaging -paint brushes -pizza boxes -bottles -containers -posters -pencils/pens -nylons -potato chip bags -Styrofoam -telephone directory -utensils -wrapping paper - printer cartridges -etc, etc, etc

The amount of material going to landfill from this university could potentially decrease if the Wet-Dry system were implemented. It is important to note that while the system is designed to be as simple and all-inclusive as possible, there are a number of steps an institution of this size can take to get the most out of waste material beyond the two bag approach. This includes on-site composting and separation of paper from the Dry material. Mount Allison could reap the benefits of creating its own fertilizer from the compost, and could continue to donate its recyclable paper to the Dorchester Penitentiary.[7] To supplement the changeover, better signage and more recycling containers around the campus (both inside and outside), could also improve the current system.

Case Studies

Acadia University

Acadia University in Wolfville, Nova Scotia recently implemented an upgraded waste management program on their campus. Though the program is currently running in only a handful of buildings, there are plans in place to expand throughout the university. In two of the residences, each room is equipped with a two-slotted recycling bin for paper and beverage containers. Attached to this is a container for compostable material. On each floor there is a central bin for recyclables and compost. Students are responsible for emptying their waste into these bins. Following this the custodial staff transfers each floor's waste to a main bin on the ground floor. The grounds staff are responsible for transporting garbage, recyclables, and compost to the local solid waste facility. In addition, the university is currently constructing a botanical garden and research station on campus. When this facility is finished, composting will be done on site and the biodegrading process studied by the science departments.

University of Waterloo

The University of Waterloo has an extensive composting program in place. This program has three main components:

- **Windrow composting** is used mainly for yard wastes."Windrows are long rows of organic material stacked into elongated piles with a triangular cross-section

  (approximately five metres across and two metres high). Leaves, yard waste and flowers from the beds on campus have been

[7] Information on the Wet-Dry system obtained throught a meeting with public relations personnel Marc Ducette, May 2000.

composted since the early 70's... The windrow is turned with front-end loaders on a regular basis, as time permits or as needed (approximately every 2-3 months). The resulting compost is used for greenhouse potting soil, fill for tree holes, and topsoil. Branches and tree parts are collected and chipped. The wood chips are used on campus gardens and walkways."

- **"Backyard" composting** is used for smaller scale operations such as "Minota Hagey Residence and the Environmental Studies coffee shop. In 1996, students made 3-bin composters for implementation at Colleges and other small coffee shops, where this type of composting is recommended."

- **"Vermicomposting** is the process of using earthworms and other micro-organisms to convert organic waste into a dark, nutrient-rich soil conditioner." This method is recommended for office use. Currently several offices on the Waterloo campus are using this method.

By using organic waste to produce compost, not only does the university have an inexpensive source of fertilizer for house plants, gardens, shrubs, lawns and trees but a significant quantity of waste is diverted from the landfill. (http://www.adm.uwaterloo.ca/infowast/composting.html)

Recommendations

For Senior Administration:

1. Make funds available to purchase a cardboard baler for Jennings Hall.

2. Secure funds for the implementation of an effective campus wide recycling program.

For Staff:

3. In addition to regular garbage cans outside add a bin for recycling drink containers next to all garbage cans on the main campus grounds.

4. Label garbage cans with a sign reading: Please put all paper, cardboard, and drinking containers in the bins provided.

5. Sodex`ho Alliance should pursue the possibility of recycling more of their solid waste materials. These materials could either be picked up by _, or be transported to the Westmorland-Albert Solid Waste Corporation. These materials include plastic, cardboard and aluminum/tin cans.

6. Further research the possibility of mulching and composting yard waste on campus. With proper composting methods the concerns over the spread of disease might be avoided.

7. Initiate a paper recycling program in all academic buildings and in all offices. This program should be constructed so that a blue paper recycling box should be found in every classroom and in all offices. A common paper collection site should be in place on each floor of the buildings where individual boxes can be emptied.

8. The time line illustrated in figure 9.2 is a plan for improving solid waste management on this campus beginning with maximizing the potential of the existing recycling program, through to implementation of the Wet-Dry program, and the creation of an on-site compost.

Figure 9.2

Time Frame	Goal	Plan of Action
August-September 2000	1.Increase awareness amongst students, staff, faculty and administration on Mount Allison's existing recycling program.	-increased signage on recycling bins and garbage cans -announcements at meetings (staff, residences, administration, etc) to educate about the system and encourage increased usage
	2. Continue researching the logistics of implementing the Wet-Dry system at the university	-set up a group of students, custodial staff and supervisors, grounds staff and supervisors, and the appropriate administrators to conduct this research
-when funding options become clearer	3. Expand the existing recycling system to include... a)bins for beverage containers outside the library and the Student Centre b) a bin for drinking containers next to every paper recycling box c) bins in each office for paper recycling	-locate the funding required, either in the Facilities Management budget or through outside funding grants
October 2000	4. Create a compost site on campus	-have those members of the university community who have expertise in composting work on creation and maintenance
	5. Start a campus-wide composting system	-place buckets on each floor of the administrative, academic, and residence buildings for compost material. -set up student volunteers to empty buckets daily into the central compost
ongoing	6. Monitor recyclable and compostable content in garbage sent to landfill	-conduct monthly inspections of garbage bags prior to removal from campus, record results -increase education and encouragement on recycling and composting according to findings
January 2001	7. Have funding and infrastructure prepared for implementation of the Wet-Dry system	-to be decided by the group proposed to meet goal #2

For Faculty and Staff:

9. Ask suppliers of products to minimize packaging and inquire as to whether they`ll pick up and reuse bubble paper, Styrofoam packing pieces, etc.

For Students:

10. The recycling representative in each residence should have a much larger role than making sure all bottles are ready for pick up. Duties could include:
    - Posting signs over bins instructing what can and can`t be recycled and ensuring that they are followed.
    - Setting up containers for reusables like yogurt containers and plastic bags and taking them to preschools, the Salvation Army,etc .
    - Putting out a box in September and April to collect discarded clothes and other items, when students are packing or unpacking, to take to the Salvation Army.

For Staff, Faculty and Students:

11. Make an effort to ensure that everything that can be reused or recycled is not thrown out.

12. If living off campus Wheatons (536-0351) will pick up recyclables and also give information about what can and can`t be recycled.

13. Canvas bags and backpacks can be used instead of plastic bags. If you do have plastic bags, the Salvation Army will accept them and reuse them.

14. Daycares, kindergarten class rooms etc. will often gladly take old yogurt containers, etc. for arts and crafts.

15. Bring unwanted clothing, books, furniture, etc. to the Salvation Army.

16. Educate those around you if you notice them throwing out something which could be recycled or reused.

17. Before making any purchase, business related or personal, consider the following questions before making a decision:
    - Do I really need this product ?
    - Can I buy it used ?
    - Could I repair or refurbish the old item instead ?
    - Can I loan or lease it from someone else ?
    - Does it contain recycled/recovered materials ?
    - Will this product reduce waste in my office ?
    - Is it made from non toxic materials ?
    - What kind of packaging is used ?
    - Is it reusable or recyclable ?

Figure 9.3 Review of Current Environmental Policy

Current Performance Indicator	Current State of Affairs	Proposed Change to Performance Indicator
There is an effective paper waste reduction program.	Paper waste is still a major issue at Mount Allison University. The amount of paper consumed has increased since 1998.	Establish specific policies on paper consumption with target dates for implementation.
An effective recycling program is maintained across campus.	In order to increase participation, the current recycling program requires improved signage, and more bins.	Adopt the time line proposed in this audit to accompany the existing performance indicator.
Furniture is offered for sale or donation prior to disposal.	Limited effort is made to make furniture available for sale or donation.	No change proposed.
Yard waste is used as mulch on campus grounds.	Yard waste is sent to landfill.	No change proposed.

Letter Grade: D

Paper

Introduction

The last audit reported that 4 498 218 sheets of paper were consumed between 1997 and 1998. The total paper consumed in 1998-1999 was approximately 6 450 000 sheets. This increase in paper consumption has two sources. First, the 1997-1998 total did not include speciality papers such as coloured and card stock paper (it is estimated that approximately 900 000 sheets of speciality paper were consumed during 1997-1998). The remaining increase can be attributed to higher paper consumption at Repro Graphics in 1999-2000 (approximately 630,000 sheets).

Environmental Significance

Consumption of paper products has a direct and significant impact on the natural environment. In the past, we used Canada's size and seemingly endless resources to justify our wasteful habits. However, we can no longer ignore the connection between the products we consume and the health of our environment. According to the State of the World 2000 report, "[i]n 1997...the world produced 299 million tons of paper. Global demand for paper is expected to rise by nearly 31 percent by 2010. Since 1980, global paper consumption has jumped by 14 percent while that of printing and writing has skyrocketed by 110 percent. Currently, printing and writing papers account for 30 percent of all paper use. Growth in demand for printing and writing paper is expected to exceed growth in demand for paper in general."[1] As consumption of paper products grows so too will the environmental consequences. Mounting demands for paper products place pressure on remaining forest land. "Canada's national territory includes about 10 percent of the world's forests, 35 percent of the world's boreal forests and 20 percent of the world's temperate forest. Canada contains about one fourth of the Earth's remaining frontier forest– the large, relatively undisturbed forest areas with sufficient area to maintain all of their native biodiversity."[2] Production of paper products has a number of serious environmental consequences. "Converting [trees] into paper requires large amounts of energy, water, and chemicals, and it generates vast amounts of air and water pollution and solid waste" [3]Declining forest land results in the loss of biodiversity and natural habitat, loss of freshwater reservoirs and reduction in carbon storehouses. "North American forest ecosystems store a significant proportion of the global total of biotic carbon"[4] As such, forests play an important role in reducing the effects of climate change. Clearcutting of forests has severe ecological consequences including erosion, pollution of water bodies and loss of species habitat. In light of the escalating consumption of paper products and the environmental consequences of such consumption, we must seek to eliminate unnecessary paper usage, reuse whenever possible, and, when no longer useful, recycle.

Current Environmental Policy

There is currently no policy regarding paper, save a performance indicator in the Solid Waste section that states: "There is an effective paper waste reduction program."

Responsible Parties

Michelle Strain, Manager of Support Services at Mount Allison, co-ordinates the ordering of paper for photocopy machines and printers in all campus departments. Support Services also oversees the activities of Repro graphics.

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[1]State of the World 2000, The Worldwatch Institute, Chapter 6, 101-106

[2]World Resources Institute http://www.wri.org/gfw/canada.html

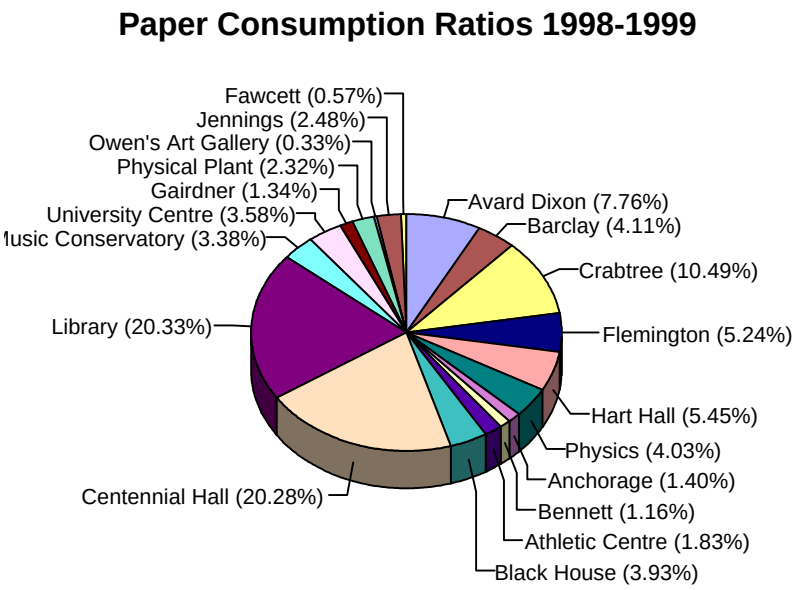
[3]State of the World 2000, The Worldwatch Institute, Chapter 6, 107

[4]World Resources Institute http://www.wri.org/gfw/canada.html

Audit

The majority of paper consumption on campus is attributed to the library (20.33%), followed closely by Centennial Hall (20.28%), and the larger academic buildings (between about 5 and 10% each). The library's paper consumption is a result of the four photocopiers located in the building. These machines are the main ones available to students and are used extensively during the academic year. Centennial Hall's consumption is due to the Financial Services department communications, and the admissions mailings from Student Administrative Services. In addition, much of the university's communications occurs in the President's and Vice Presidents' offices located here. In the academic buildings, photocopiers and staff use of paper are the main sources of consumption. Each academic department purchases a given amount of paper using their departmental budget.

Figure 10.1



Mount Allison has recently entered into a new contract with Xerox for all the paper purchased by the university. Xerox has a policy to purchase paper only from the companies that "are committed to sound environmental practice and sustainable forestry management...[these] companies must be in full compliance with environmental regulatory requirements in the countries where they operate." In Canada the regulations are not consistent for all the provinces but vary from one to the next. It is unknown from which company Xerox purchases its paper. Xerox was unable to answer the auditors' questions regarding the content of old-growth wood fibre in their paper.

Photocopying and printing are two major sources of paper consumption at the university. Mount Allison, along with all other Maritime universities, makes a collective contract for photocopy suppliers. For the 1999-2000 academic year, the university had a photocopier contract with Xerox. A new contract with Canon copiers comes into effect in August, 2000. Canon has an environmental policy and manufactures its analogue machines from recycled parts. Canon's environmental policy can be found on the company web site: http://www.canon.com/environment/a-01.html The university currently uses 45 computer printers and 28 photocopy machines. During the 1999-2000 academic year, the combined use of these resulted in 2.8 million one sided sheets being used every year. In 1999-2000, Repro graphics printed approximately 3.6 million sheets. Approximately 20 per cent of Repro graphics' paper consumption was due to external users such as the Town of Sackville. In an effort to reduce paper consumption, Support Services will be replacing the majority of the existing photocopiers and printers with 26 digital machines that will be able to copy and print. These machines will be set to print double-sided as the default. Six of the most efficient printers and six analog copiers will be kept in addition to the new machines. Mount Allison is the only university in the maritime contract making the change to digital machines. While there have been increased costs associated with the more efficient digital machines, it is hoped that these costs will be recovered in paper savings. As part of the new system, copy card scanners will be connected to computers. After a job is sent to print, the card will automatically be charged. Support Services hopes that this initiative will result in decreased paper wastage.

The "Record", the alumni magazine published by the external relations office is approximately 40 pages long and is distributed three times a year to 18,000 alumni. A notable change from the last audit is that this publication is now printed on recycled paper.

The paper towel used by the university is 100% recycled with 80% post consumer

content, this product is supplied by Unisource. The toilet paper is purchased from G.H. Wood and is also 100% recycled.

The last audit states that "Letterhead used by the university has no recycled content." However, this year's auditors were informed that the letterhead has, for many years, been printed on 50% pre-consumer and 20% post-consumer recycled paper with the Mount Allison watermark.

When asked "Would you use unbleached and/or recycled paper if it was offered?", 98% of respondents to the Environmental Audit Campus Questionnaire answered yes. Recycled paper is currently available for sale in the university bookstore. In addition, Repro graphics can copy onto recycled paper for a small additional cost. The premium for recycled paper (20 % post consumer) in the inter-university contract has lowered, from 20 % to 7 %, making it more financially feasible. While offices on campus continue to use unrecycled paper, it is hoped that money saved from using the more efficient digital machines can help to offset the additional cost of recycled paper.

At Mount Allison, a paper recycling program has been in place since 1989. Currently most kinds of paper can be recycled including newsprint, foolscap, white and coloured paper, and cardboard (except corrugated). Paper placed in recycling bins continues to be shredded and sent to the Penitentiary in Dorchester where it is used as animal bedding. This practice began in September 1998. Unfortunately, as is mentioned in the Solid Waste chapter, close to 50% of the waste in a sample of campus garbage consisted of recyclable paper products. Facilities Management is presently examining the feasibility of purchasing small plastic bins for each office on campus in the hopes that this will make recycling easier for people as well as serving as a reminding tool. It was mentioned in the 1998 audit that the improved recycling program designed by Tim Bezel, then Custodial Supervisor, was not implemented for reasons of cost and increased work load for the custodial staff. This summer the issue was readdressed by the current Custodial Supervisor, Audrey Kenny. If the program is implemented it will provide each office and residence room with individual-size plastic recycling containers, and larger bins on each floor or area.

Email and the university website continue to be used for mass communication within the university community. In response to the Questionnaire question "What initiatives have you or your department taken to decrease your environmental impact?", some faculty mentioned placing material for courses on the departmental website instead of printing off individual copies for students. The library recently switched to E-mail for overdue notices. Between May 1999 and April 2000, the library sent 14,000 notices, each on a large sheet of paper. It is expected that the transition to email notices will result in significant paper savings. Student Administrative Services maintains an online application form on the university website. Since January 1999, 703 students have applied via this site, out of approximately 2000 in each of the two application sessions. Although the S.A.S. is required to print these applications for processing, much paper is saved in the reduced amount of applications mailed out. The academic calendar is now available in full on the Mount Allison website, although the university continues to print 9000 copies each year. However, the director of the department informed the auditors that once the technology is in place for online registration, students will be asked to rely on the web version of ther calendar and a limited number of paper versions will be available. This change is scheduled to take place in the next year[5].

The university's bulk E-mail policy has not been amended from the version that appears in the 1998 audit. Certain departments are given standing permission to send out one mass E-mail per week. Beyond this, permission is required on a per-email basis from one of the vice presidents. It is feared that without this policy in place, the amount of mass E-mails would become bothersome and the important messages would not be read. There are still a wide variety of intra-university mailings that use paper, often unnecessarily. In addition, many people persist in printing out hard copies of E-mails. This was identified by several Questionnaire respondents as an area of obvious wastage on campus.

In response to the question "Would you accept assignments via E-mail from students?", only 58% of faculty answered yes. Difficulty reading long assignments off the computer screen, the problem of how to provide comments, and lack of professional appearance were listed as reasons for not accepting assignments this way. In response to the question, "Would you accept assignments double-sided?" 90% of faculty answered yes. This is the same percentage as was found when the survey was conducted in 1998. 92% of faculty responded yes to the question "Would you accept assignments on one-sided paper (paper which has been used on one side) from students?". The high percentage of positive responses to these two questions is indicative of a willingness on the part of the faculty to accommodate paper conserving measures on the part of their students. One faculty member noted that not only are assignments accepted double-sided, "in most courses I *only* accept

[5]Information obtained from an interview with Sara Lochhead, Director of Student Administrative Services, July 2000.

assignments this way".

Case Study

The University of Vermont has introduced a competitively-priced copier paper which is 60 per cent post consumer content and chlorine free. This paper is bleached with oxygen or hydrogen peroxide instead of chlorine, thus eliminating a source of harmful dioxins. The university's decision to convert to chlorine free, recycled paper is supported by a policy which calls for using "paper with a minimum of 30% recycled post consumer waste whenever possible. A preference has also been set for paper produced without chlorine bleaching."
(http://esf.uvm.edu/envcncl/paper/paper.html)

Recommendations

For Senior Administration:

1. Create a section on paper consumption for the Environmental Policy, complete with performance indicators.

2. Make a commitment to eliminate purchases of all paper products containing old growth wood fibre.

3. On all paper bought by the university be sure that it states clearly the recycled content. This should be something that the university is proud of and advertises. Prospective students and alumni alike will be impressed with Mount Allison's commitment to the environment.

4. Continue to investigate the possibility of offering higher post-consumer content paper.

5. Make it policy to have Repro print on both sides of the paper whenever possible. The only time it would not be possible would be when there is only one page of information.

6. Inform all contracted companies of the university's concerns as to paper wastage, and ask that all things to be printed on both sides and on recycled paper.

7. Make it university policy that all intra-university communication and as much external communication as possible be done on E-mail to save paper.

8. Request that Xerox disclose the forest management practices of the timber companies that supply the pulp. Almost all recycled paper has some virgin wood used in its manufacturing.

9. Encourage prospective students to use the Mount Allison website for information and applying instead of hard copies received in the mail.

10. Contact other Universities under the inter-university tender and urge them to switch to recycled paper.

11. Co-ordinate the selection of environmental representatives from each department (both academic and non-academic) on campus. These representatives would be responsible for implementing the policy in their departments. They could hold a "training session" on environmentally friendly practices in the office and classroom, including how to copy on paper that has already been used on one side, how to copy on both sides, what can be recycled, and energy conservation tips.

For Faculty:

12. Inform students that assignments must use both sides of the paper, either by printing double-sided or by using paper already used on one side.

13. Encourage students to submit shorter assignments via E-mail and allow students to use this method when submitting longer essays as well.

14. Reuse all departmental paper that has only been used on one side. One sided paper can also be made into scratch pads free of charge at Central Stores. One sided paper should not be recycled, half of it is still perfectly good.

15. Reduce your own paper consumption by using E-mail as much as possible and not printing anything you don't have to.

16. Suggest a departmental policy that all copying be done on both sides of the paper

17. When possible, use overheads instead of handouts.

18. Keep a box in your office and classrooms for paper that you empty periodically into the main recycling boxes in your building.

19. Consider using part of the department's budget for a paper shredder so that confidential documents can be recycled.

For Staff:

20. Stop giving course calendars to upper year students. Require that students use the website instead. Upon request students could receive a calendar for special circumstances.

21. Reuse all departmental paper that has only been used on one side. One sided paper can also be made into scratch pads free of charge at Central Stores. One sided paper should not be recycled, half of it is still perfectly good.

22. Reduce your own paper consumption by using E-mail and not printing anything that you don't have to.

23. Make a department policy that all photocopies are done on both sides of the paper.

24. Keep a box in your office for paper to be emptied periodically into the main recycling box

25. Consider using part of the department's budget on a paper shredder so confidential documents can be recycled.

26. Print all exams and exam booklets on both sides of the paper. Provide extra paper at exam locations for students who will need it for rough work.

27. Put signs on all garbage cans reading: "Please put paper, cardboard and drink containers in the appropriate bin for recycling."

For Students:

28. Encourage the SAC office to purchase recycled paper products.

29. Ask your professor if you can hand in assignments single spaced and/or double sided or via E-mail. If told that you can't, ask why not.

30. Read books on course reserve in the library rather than photocopying the pages.

31. Use posters minimally, and if you do make them, use paper that has already been used on one side.

32. Reuse all one sided paper (to print assignments on the other side, for signs, for rough work, for class notes, etc.)

33. If you live in residence, keep a box in your room to be emptied periodically into the main recycling bin. If you live off campus, keep paper products and all other recyclables separate (including cardboard) and Wheatons will come and pick them up. Call 536-0351.

34. When buying new paper, buy unbleached and with the greatest post-consumer content you can find. If the store does not carry recycled paper, request it.

35. Student groups could make desk top boxes out of cereal containers and distribute them to staff and students to use for recycled paper.

Letter Grade: C

Food

Introduction

In 1999-2000, the Mount Allison community consumed approximately 10 205.77 kilograms per week of food and beverages in the meal hall and Golden A Café. This amounts to roughly 306 173.1 kg over the academic year. This figure is 25 917.98 kg more than the total reported in 1998. The increase can be partly attributed to the inclusion of beverages in this year's total.

Environmental Significance

There is a strong interrelationship between food and environmental quality. On one hand, the choices we make about what foods we will consume directly impact the health of our environment. On the other hand, environmental conditions determine the kind and quantity of food that can be produced. In a world of limited resources, growing population places pressure on the world's agricultural systems. Global population now exceeds six billion. Even if the world were to adopt a reduced, plant-based diet, feeding everyone would still prove a great challenge. It goes without saying, therefore, that the North American diet, which derives 25% of its calories from animal products is highly unsustainable. Indeed, the excesses of the North American diet have consequences not only for the environment but also for individual health. A diet high in fat and low in plant material has been linked to cancer, coronary heart disease and diabetes. Our animal based diet is not only unhealthy but it can support only a small proportion of the world's population.

According to Earthsave Canada, the grain used to feed cattle needed to produce one pound of hamburger could make 8 loaves of bread or 24 plates of spaghetti. The water used to produce one pound of hamburger (2,500 gallons) could be used to grow more than 50 pounds of fruits and vegetables. Cattle consume 70 percent of all grain in the United States. Half of all water consumed in the US is used to grow feed and provide drinking water for cattle and other livestock.[1] By choosing to consume foods lower on the food chain, we improve the earth's ability to sustain all of its inhabitants.

The world's agricultural land is very sensitive to environmental change. Problems such as acid rain, soil salinisation, climate change and erosion have a devastating effect on agricultural productivity. Thus if we are to protect our environment, we must make responsible choices about what foods we consume and if we wish to ensure future food production, we must consider our environment.

As a large institution, representing a few thousand students, faculty and staff, Mount Allison holds significant power of choice. Our purchasing choices will, to a large degree, determine the extent of our environmental impact. Poor decisions (for example, the decision to buy tropical fruits, which result in fossil fuel emissions from transportation) have the potential to cause great environmental damage. By the same token, decisions that consider ecological consequences (for example, the decision to purchase food from local sources) can lead the way for positive environmental change.

Current Environmental Policy

"The University will endeavour, through the Department of Administrative Services, to minimize the ecological impact of food consumption on campus."

The performance indicators for this section are as follows:

- " Packaging and waste are minimized.
- Organic(pesticide/herbicide free) and seasonal options(food that does not have to be preserved) are used.

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[1]Earthsave Canada http://www.earthsave.bc.ca/

- Food is procured from local sources
- Information regarding ingredients and processing practices are made available to students
- Products which meet or exceed the standards outlined by the National Ecology labelling system are purchased.
- Environmentally friendly cleaning supplies are being used
- China or reusable plastics are used
- Food and cardboard recycling programs are used" (Section 2.7, Mount Allison University Environmental Policy, www.mta.ca/environment/)

Responsible Parties

All food on campus, with the exception of that served by the President's Cottage and Cranewood, is supplied by Sodex'ho Alliance. Under the direction of Mark Henchey, Sodex'ho Alliance is responsible for the operation of the Golden A Café and the Jennings meal hall. Changes to food service are made through a suggestions board and through residence representatives.

Audit

With the exception of the food served at the President's Cottage and at Cranewood, all food on campus is prepared by Sodex'ho Alliance. This food is served at the Golden A Café and at the Jennings meal hall. Food at the café is sold on an item by item basis. All students living in residence, with the exception of those in the Pavilion Bousquet, are required to purchase a meal plan which entitles them to 14 or 19 all-you-can-eat meals per week. Those not on the meal plan can purchase meals individually.

Since the opening of the Jennings meal hall, the Director of Sodex'ho Alliance has noticed a shift in food consumption patterns. Whereas the McConnell meal hall offered vegetarian options next to non-vegetarian items, the new facility includes a separate vegetarian section. The Director estimates that since Jennings' opening, consumption of vegetarian entrées has increased by six times (from approximately 30-50 vegetarian dishes a meal to 300 vegetarian dishes a meal). However, the majority of the students consuming vegetarian dishes also consume meat dishes.

While this would seem to indicate an improved vegetarian menu, all of the twelve vegetarians who responded to the Environmental Audit Campus Questionnaire felt there were too few vegetarian options available at the meal hall.

Currently,the information available on the ingredients of individual dishes is limited. In many cases, the only way of knowing if a dish is compatible with one's diet (for example, if it contains ingredients one is allergic to or if it is vegetarian) is to consult a member of the Sodhex'ho staff. In the future, the Director hopes to have available for student reference a binder containing the nutritional information and ingredients of all dishes offered.

Sodex'ho Alliance has a national food purchasing contract with Serca Foods (formerly Clover Distributers). Because of the large-scale nature of the contract it is at times difficult to determine the source of food purchased. The auditors contacted Serca, as well as Ben's Bakery (which supplies Sodex'ho's bread) and Baxter Milk (Sodex'ho's dairy supplier). Ben's Bakery reported a number of environmental initiatives including emission controls on their ovens, a recycling program and diversion of its food scraps to a pig farm. Despite this, Ben's does not make use of organic or locally grown ingredients and has no environmental policy. The auditors were not able to obtain information on the environmental practices of Serca Foods or Baxter Milk.

The meal hall and the café offer only limited quantities of locally grown food. Neither the meal hall nor the café offers organic options. According to the Director, these items are too expensive and not available in large enough quantities for the university's needs. Local suppliers of organic foods might also fail to meet Sodex'ho Alliance's guidelines relating to sanitation, workplace hazards and liability clauses. Of the meal hall and café users who responded to the question "would you purchase organic food if it were offered?", 54 respondents out of 61 (89%) answered yes. The Director is interested in the possibility of introducing locally grown or organic options, but indicated that such a change would not be made unless clearly supported by a majority of students.

Case Study

Bates College (approximately 1600 students) in Lewiston, Maine has an innovative, environmentally-friendly dining program."The goals of the Food Service are simple: reduce waste, reduce cost, support the local economy, provide healthy, high-quality food, and protect the environment. All of these objectives are being met. Initiatives include food purchasing changes, recycling, pre and

post-consumer food composting, source reduction strategies, cooperative arrangement with organic farmers and shelters, and constant innovation. Two percent of Bates' fruits and vegetables are locally and organically grown. All food scraps are diverted from the landfill, and some resulting compost is returned to the campus for use in plantings; local farms compost pre-consumer food scraps, and use post-consumer food scraps for pig feed. All pre-consumer food waste is composted by a local farmer who mixes it with the city of Lisbon's yard trimmings. (Bates receives a certain amount of compost back each year.) All post-consumer food waste is collected in the dish room by specially designed strainers, and hauled to a pig farmer for feed. Bates' Food Service supports the local economy by buying locally grown organic food whenever possible. A collaborative purchasing effort by the Maine Organic Farmers and Gardeners Association, the Maine Department of Agriculture, the University of Maine Cooperative Extension, the Executive Chef at Bates, and other Bates key players led to a loose co-op of local farmers who provide seasonal, organic food for the College. Bates' emphasis on locally produced, organically grown food provides economic stability to local organic farmers, helps protect the environment by reducing transportation and pesticide impacts, and provides healthy, high quality food to the Bates community. An outreach component of the program, started in 1992, is to provide Hope Haven Gospel Mission, a Lewiston Christian soup kitchen and shelter, with food on a daily basis. Each day, uneaten food from the Bates cafeteria is picked up and used to feed poor and homeless city residents. The food from Bates feeds fifty to a hundred people daily." [2]

Recommendations

For Sodex'ho Alliance:

1. Purchase products made without chemical additives or pesticides, whenever they are less than 5% more expensive in price. Label these products or ingredients as *Organic* in the meal hall and Golden A Café.

2. Begin offering an organic option in the meal hall by providing one meal with organic components every week. With sufficient student demand, increase this quantity over four years until most meals include an organic option.

3. Request product information regarding ingredients, processing methods and suppliers for all food items supplied by Sodex'ho Alliance and make it available to students.

4. Consider donating extra food to a charitable cause, such as a soup kitchen or a Meals-on-Wheels program.

For Students:

5. Request product information from Sodex'ho Alliance regarding ingredients, processing methods and suppliers for all food items.

6. Avoid eating those foods which do not meet environmental and socially acceptable standards.

7. Reduce portions and meat content from your diet.

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[2]Campus Greening
http://www.nwf.org/campus/yearbooks/yb99/yrbkbates.htm

Figure 11.1 Review of Current Environmental Policy

Current Performance Indicator	Current State of Affairs	Proposed Changes to Performance Indicator
Packaging and waste are minimized.	Targets have not been established to reduce packaging and waste.	No change proposed.
Organic (pesticide/herbicide free) and seasonal options(food that does not have to be preserved) are used.	No organic options are currently available; some changes in foods offered depending on the season.	No change proposed.
Food is procured from local sources	Majority of food not purchased from local sources.	No change proposed.
Information regarding ingredients and processing practices are made available to students	The Director of Sodex'ho has plans to make available to students a binder listing the ingredients and processing practices of all dishes served in the meal hall.	No change proposed.
Products which meet or exceed the standards outlined by the National Ecology labelling system are purchased.	The National Ecology labelling system does not contain many food products in its listings.	Research a labelling system specific to the food industry and revise this performance indicator accordingly.
Environmentally friendly cleaning supplies are being used	The products used are biodegradable.	No change proposed.
China or reusable plastics are used	China is used in the meal hall. The Golden A Café utilizes Styrofoam and picnics/outdoor functions also used Styrofoam.	Indicate where and in what circumstances that china or reusable plastics should be used.
Food and cardboard recycling programs are used.	Food is currently being sent to a pig farm and used as pig feed. Cardboard continues to be recycled.	No change proposed.

Letter Grade: C

Water

Introduction

In 1999 Mount Allison was billed for 178 382 000 litres of water. No comparison can be made because the billing system was changed in 1998 from a fixture oriented system to a system that actually meters the amount of water used. The data for the amount of water used in 1998 was not available to the auditors because of the change in the billing system.

Environmental Significance

The planet is covered by approximately 70% water, of which only 2.5% is freshwater, and two thirds of this freshwater is frozen in icecaps and glaciers. After we take accessibility and timing (floods and monsoons) into account we are left with about 0.8% of the world's water as being available for use.[1] If we take into account the growing population of the human race and the unchanging amount of water, conservation seems only logical.

"Water is not a renewable resource. Renewable resources can reproduce themselves... Water cannot reproduce itself. Water is recycled by means of the hydrological cycle: evaporation plus transpiration by plants, to cloud formation, to rain and snow, back to plants, rivers and ground water, to the oceans and cycling around again by means of evaporation, transpiration and precipitation."[2] "A point that is not often understood is that only about 1% of the water in the Great Lakes is replaced every year through the natural water cycle... The other 99% is fossil water, from the melting of glaciers about 12 000 years ago."[3]

"During the last several decades, as the number of groundwater wells skyrocketed, aquifer depletion has spread from isolated pockets to large areas of irrigated cropland."[4] The demand for water in the industrial, agricultural and urban sectors is putting increasing strain on our aquifer and water reserves. "Groundwater is a very important source of water supply in the Atlantic Region; nearly 1.2 million people rely entirely on groundwater for their home water needs."[5] Sackville is no exception to this rule and therefore neither is Mount Allison.

Our freshwater supply is continually being threatened by human induced pollution, either in the form of runoff contamination or acid rain. The human species constantly degenerates other species habitat: freshwater reservoirs block fish spawning runs, acidification of lakes and rivers caused by acid rain adversely affects many aquatic organisms, and the drainage of wetlands for expansion of cities and towns destroys insect and waterfowl habitat as well as valuable natural water filtration sites.

Another threat to our water supply is in international politics and trade agreements. Both the North American Free Trade Agreement, and the General Agreement on Tariffs and Trade contain clauses that prohibit quantitative controls on exported goods. This means that under these systems, and as long as water is termed a "good", an "investment' or a "service", a nation's decision to limit exports of water for environmental or other reasons is considered a barrier to trade. (General Agreement on Tariffs and Trade, Article XI). Water conservation experts predict that as long as water is subject to these regulations, no amount of domestic legislation will be able to halt bulk water exports. The long-term result of removing large volumes of water from lakes and rivers will be devastating, as bodies of water are

[1] World water use to soar to crisis levels: study, Globe and Mail, March 14 2000

[2] Shirley Conover, letter to the Globe and Mail cited in Villers, M Water

[3] Villiers, M., Water, exert from Globe and Mail, A15, November 18 1999

[4] State of the World 2000, The Worldwatch Institute, Chapter 3, page 41

[5] Eaton, P. et al., State of the Environment in the Atlantic Region, Environment Canada, 1994

drained faster than they can naturally be replenished eliminating not only the resource itself, but also the habitat of numerous species and the livelihood of the people dependent on these sites. Already, numerous lakes in Canada have been targeted for bulk exports, including Gisborne Lake in Newfoundland, and the Great Lakes. Instead of promoting bulk exports as a means of repairing damage caused by wastage, what is required is sustainable management of water resources globally.

Current Environmental Policy

"Under this policy, the university will endeavour, through the supervision of Facilities Management, to minimise water consumption.

The performances indicators for the following section are as follows:

- Water efficient models are installed when replacing any water fixtures on campus.
- Projects are undertaken to decrease water usage.
- Longevity and water efficiency are primary considerations when purchasing water fixtures." (Section 2.5, Mount Allison University Environmental Policy, www.mta.ca/environment)

Audit

In 1999, Mount Allison was billed for 178 382 m^3 of water at a cost of $278 376.10. This is almost one hundred cubic metres more than was used between May 1997 and April 1998. The university purchases water from the Town of Sackville. The price of water increased from 75 cents per cubic metre at the time of the last audit, to $1.53 in August 1998 as a result of the change in billing. When new water meters were installed on individual buildings, billing became more accurate. Prior to this, the university was charged a flat rate based on the number of fixtures in each building. The sewer rate corresponded to the water used per fixture. When the new treatment plant was installed, the town fitted the university buildings with individual meters. At that time, rates were adjusted to pay for the new treatment plant. The university is billed twice per year, as of March, 1999. Prior to this, billing occurred four times yearly, making it easier to determine seasonal water usage trends. Appendix S shows the university's total water consumption per 6 month period for 1999 and the first half of 2000.

In descending order, the locations on campus with the highest water consumption are Trueman/McConnell, Barclay, Harper/Jennings, the Athletic Centre, Windsor, and Edwards/Thorton. This ranking is comparable to that found in the 1998 report with the exception of Trueman/McConnell. Water consumption in this building increased drastically last year as McConnell was the only meal hall open while renovations took place in Jennings. Generally speaking, water consumption is quite varied between the two halves of the year for which the university is billed. In Crabtree, for example, 9348 m^3 of water were consumed between January 1 and June 30, 1999. This dropped to 2554m^3 in the July 1-December 31, 1999 billing. Some efforts have been made to conserve water by installing water saving fixtures, such as low-flow toilets, however the Technical Services Manager informed the auditors that these replacements have been minimal since it is not financially feasible for the university to replace fixtures unless they are broken. Fluctuations in water use are likely due to seasonal needs and the academic year.

The town of Sackville's water supply comes from an underground water table. The water is first pumped out of two deep wells into what is called a raw well. From the raw well the water is run through a green sand filter and into the clear well, it is at this stage that the water is chlorinated. After the chlorination process the water is pumped out for circulation into the town. When the used water returns to the town's system it is pumped from twelve pump houses to one of two sewage treatment ponds. These lagoons accept mostly residential waste. These ponds are located in Middle Sackville and behind the municipal garage in the industrial park. These are open air ponds and therefore aerated by the wind from the marsh. The sewage is left in these ponds until it separates into its solid and liquid by-products. The liquid, water, is drained out of the pond and recirculated into the waterways of the Tantramar Marsh and ultimately into the Bay of Fundy. The solid waste that is left is dredged when necessary and is brought to landfill for disposal. The last time that the sewage lagoons were dredged was in 1991. The ponds are monitored by the provincial Department of the Environment.

Closer contact and increased communication between the Town and the university has resulted in some water savings. The Town is able to access and read Mount Allison's water metres and can therefore pinpoint buildings with excessive water consumption compared to the buildings' normal consumption. The Town can then notify the Technical Services Manager who can investigate and repair the problem.

Hart Hall's basement is the location for the Fine Arts photo processing lab. Water wastage in this department is in part due to the lack of student awareness. The photo lab makes use of the market's most water-efficient black and white print washing

basins which run at approximately 3.79 litres per minute. Print washing requires the basin to have water flowing through them for no more than one hour for a fibre based print and five minutes for a resin coated print. During the academic year, wash basins are often found to be running all night long, this prematurely wears the filter system and adds additional cost to its operation.

Allison Gardens uses water in the winter months to maintain an ice surface in the building. Three years ago the Icemaking Plant was altered to include a closed loop that would continuously recirculate the water used to make ice.

The 1998 audit recommended that the Chemistry department seriously consider a recirculation pump for the aspirator. This measure would save a great amount of water from being used, but would remain economically and environmentally unfeasible since the energy needed to operate the pump would not offset the cost for the water consumption and would consume energy produced by non-renewable resources.

The water used in the heating system is part of a closed loop and therefore the system has minimal water input. Some water is lost through inefficiencies such as leaks in the buildings or in the steam pipes. There is considerable amount of effort put into making the heating system leak free since this makes it more energy efficient and therefore more economical..

Outdoor water use is still of little concern compared to the indoor use. The turf on campus is currently still not being watered in part due to the lack of an efficient watering system. In the summer of last year, the water source for the swan pond fountain was converted to a well. Previous to the town's water metering system the amount of water utilised by the fountain remained unknown and paid for by the town. After the implementation of the metering system the university considered shutting the fountain down instead of paying approximately $10 000 for the water bill. The town, which regards the fountain as a tourist attraction, proposed that a well should be dug to supply the fountain its necessary water. The town and the University funded the well.

As part of the 1998 audit, a survey of water fixtures on campus was conducted to estimate the areas where retrofits should be made. This survey was not repeated for this report as the amount of retrofits since 1998 has been very minimal and because no record of individual retrofits is kept by the Facilities Management department. Such records would allow for a more accurate understanding of how and where water savings are occurring on campus.

Case Studies

In 1993, the University of British Columbia added the C.K. Choi building to its campus. Among other environmentally friendly features, the building uses excellent water conserving techniques and equipment "Composting toilets installed in this project do not require water for flushing. City water is generally only required for the low flow lavatory faucets (spring loaded to further reduce waste) and kitchen sinks. Irrigation of site planting material is provided solely from collected rain water (stored in an 8,000 gallon subsurface cistern) and recycled gray water from the building. Projected water usage is approximately 300 gallons per day."(www.iar.ubc.ca/choibuilding/matsuzaki.html)

Recommendations

For Staff:

1. Accurate records of water saving measures should be compiled and unified by Facilities Management. These records should include all low-flow toilets, showers, and faucets installed on campus, as well as a current list of all water saving features included in new and renovated buildings.

2. Look into alternatives to water consuming appliances such as composting toilets.

3. Wash vehicles only when needed.

4. Conserve water on a individual basis.

For Faculty:

5. Report any leaks immediately to Facilities Management (fixit@mta.ca)

6. In labs, encourage students to conserve water whenever possible (ie washing test tubes all at once rather than individually).

7. Conserve water on a individual basis.

For Students:

8. Limit shower length to about 8 minutes.

9. Turn off water taps when brushing your teeth.

10. Report any leaks or dripping faucets immediately to Facilities Management (fixit@mta.ca)

11. Post a sign in your residence bathroom asking people to conserve water.

Figure 12.1 Review of Current Environmental Policy

Current Performance Indicators	Current State of Affairs	Proposed Changes to Performance Indicators
Water efficient models are installed when replacing any water fixtures on campus.	Water fixtures are replaced by more efficient models unless the building is up for renovation in the near future.	No change proposed.
Projects are undertaken to decrease water usage.	Projects are undertaken to make various systems more efficient (which in turn decreases water usage), but no education or awareness projects have been undertaken by the university.	Specify the different types of projects that should be pursued to decrease water consumption both on the facilities aspect and on the personal aspect.
Longevity and water efficiency are primary considerations when purchasing water fixtures.	These two factors are considered when purchasing water fixtures.	No change proposed.

Letter Grade: C

Finance

Introduction

Finances influence all aspects of Mount Allison's operations. The university receives fees from students and funding from various governmental and corporate organizations. The university uses its money to hire faculty and staff and to purchase the wide variety of goods needed to maintain an institution. Funding for 2000-2001 is projected to be $38 315 485. In 1999-2000, the university received $38 577 208 in funding. In 2000-2001, the university has budgeted for expenditures of $38 340 485. Because finances play such a fundamental role within the university, it is important to examine the environmental practices of both funding bodies and companies with which the university does business.

Environmental Significance

In a market driven economy, the choices made by individuals as well as institutions can have a direct impact on the natural environment. The natural environment affects the economy as much as the economy effects the environment. "The Intergovernmental Panel on Climate Change predicts damage caused by climate change could cost developed countries up to 2 per cent of GDP. For Canada, so dependent on natural resources, this figure would likely be much higher."[1] Investing in companies that do not have environmentally friendly practices can have serious consequences. Supporting businesses with destructive practices can only serve to accelerate the process of environmental degradation. Moreover, the choice to purchase non-environmentally friendly products (eg. virgin fibre paper over 100% post consumer) may in fact slow the development of an environmentally conscious market based on the supply-demand model of the economy. Unsustainable practices will ultimately result in the destruction of the resources upon which our economy depends. Choosing to support environmentally-friendly organizations can have both short term and long term benefits. In the short term, environmentally friendly purchasing and investment practices can serve to strengthen the reputation of an institution. In the long term, environmentally sound purchasing has numerous benefits. Supporting environmentally responsible businesses promotes the protection of resources, the conservation of energy, and the reduction of pollution. All of these measures help to ensure that reasonably-priced production will be possible in the future. An environment which has been depleted of resources is of no benefit to the economy. Ultimately then, choices which protect the environment will also protect the economy.

Current Environmental Policy

"The University will endeavour, under the supervision of the Controller to minimize the ecological impact of the products and services purchased in support of campus operations.

The performance indicators for this section are as follows:

1. Photocopiers and printers minimize the required use of paper.
2. Recycled and post-consumer paper is purchased.
3. Unbleached recycled paper is available in the Bookstore.
4. In the purchase of products, the following factors are taken into consideration:

[1] http://www.davidsuzuki.org/economyatrisk.htm

a) reduced packaging;
b) environmental performance(i.e. energy saving),
c) reduced consumption;
d) construction (i.e. recycled materials rather than tropical hardwoods, PVC); and longetivity.

5. Information is provided to departments comparing the environmental performance of different products. I.e. Fax machines that can use recycled paper, etc." (Section 2.8, Mount Allison University Environmental Policy, www.mta.ca/environment)

Responsible Parties

The Purchasing Manager in the Financial Services department is responsible for all purchase orders from the university, the External Relations office is responsible for all incoming funds to be used for the university's operations, and the Board of Regents University Investment Committee is responsible for the university's investment portfolios.

Audit

University Funding

Mount Allison receives funding from four main sources for use in the university's consolidated budget. The see total funds available from these sources refer to figure 13.1.

Figure13.1 Funding Sources

Source	Amount: 99-00	Amount: 00-01
Government grants	13 335 330	13 596 160
Student fees	17 228 760	18 041 655
Sales, rentals and other income	5 739 145	3 961 737
Endowment and trust income	2 273 973	2 715 933
Total:	38 577 208	38 315 485

Government grants account for approximately 36 percent of the total funding received each year. An increase in government funding for both the 1999-2000 and 2000-2001 academic years was insufficient to offset the university's additional requirements. Consequently, student fees increased 4.5 percent (from $4 040 to $4 220 for Canadian students) in 1999-2000. In the 2000-2001 year, fees increased by another 4% to $4 390 for Canadian students. Income from sales and rentals increased in the 1999-2000 year as a result of the Francophone Summit and a cadet camp. Income in this area decreased to normal levels in the 2000-2001 year. Income from endowment and trusts is discussed under "University Investments".

The environmental conduct of these sources has become somewhat more accountable since the time of the last audit. Although it is difficult to track the level of individual awareness among students, a representation of growing concern for environmental issues can be inferred from the conduct of the Student Administrative Council. An environmental audit of the S.A.C. was completed in the fall of 1999 and an environmental policy based on the findings passed on February 16, 2000. This policy is contained in Appendix T. The various groups that rent university buildings for summer conferences are not screened for environmental responsibility, and the books sold at the university bookstore are not selected on the basis of the suppliers' environmental conduct. Information on the environmental conduct of the university's endowments and trust funds is discussed under "University Investments".

The External Relations department at Mount Allison is responsible for soliciting outside funds for improving the university. In 1998 the university embarked on a capital campaign known as "Campaign Mount Allison", the goal being to raise money "to help meet the evolving needs of our students and faculty...to ensure that Mount Allison continues to offer the best undergraduate education in the country."(Donors Report for May 1, 1998-April 30, 1999, p.15) On April 25, 2000 the campaign reached its $20-million goal. The campaign has since been extended to May 1, 2001 with the hopes of raising another $3-million. The projects funded by the campaign include scholarships and bursaries, student research, teaching fellowships, lab equipment, library acquisitions, building improvements, faculty innovations, multimedia technologies and student leadership. External Relations does not currently screen donors for environmental or social ethics, although the auditors were informed that controversial corporations are generally avoided under the direction of the cabinet. The auditors requested a list of the top ten donors and their environmental practices/policies, but did not receive this information.

As was the case in 1998, the allocation of funds per department is determined by the budget committee and approved by the board. Figure 13.3 illustrates the direction of funds to the various academic and administrative departments and the percentage of total funds directed to each of these areas[2].

Figure 13.2 Funding per Department

Department	Amount in 1998-1999	%	Amount in 1999-2000	%	Amount in 2000-2001	%
Faculty of Arts	4 971 409	13.9	5 081 823	13.2	5 392 019	14.1
Faculty of Social Science	2 230 933	6.3	2 584 075	6.7	2 787 609	7.3
Faculty of Science	4 281 371	12.0	4 341 390	11.3	4 478 131	11.7
Academic Affairs and Con't Ed.	2 541 616	7.1	2 357 648	6.1	2 186 680	5.7
Library	1 771 863	5.0	1 942 557	5.0	1 998 764	5.2
Computing Services	1 075 744	3.0	1 237 017	3.2	1 247 338	3.3
Admin. and General Services	4 437 794	12.4	4 678 317	12.1	4 743 276	12.4
Physical Plant	5 931 891	16.6	7 042 005	18.3	7 136 934	18.6
Student Services	2 227 214	6.2	2 308 248	6.0	2 510 626	6.6
Direct ancillary expenditures	4 984 525	14.0	5 174 745	13.4	4 690 107	12.2
Other Budgets	592 435	1.7	457 289	1.2	689 000	1.8
Interfund Transfers	643 450	1.8	1 362 094	3.5	480 000	1.3
Total:	35 690 245	100.0	38 567 208	100.0	38 340 485	100.1

[2]This information is taken out of the Mount Allison University 1999-2000, and 2000-2001 Budgets. The data for 1998-1999 is adjusted from the original budget for that year, which was used in the 1998 audit report.

This break-down shows a decrease in the percentage of funds directed to the Faculty of Arts and the Faculty of Science in 1999-2000, though the percentage of funds being directed to all three academic faculties is budgeted to increase for the next academic year.

The academic departments receive additional funding for research puposes from national foundations to supplement that which is included in the annual budget. The primary foundations are the National Research Council of Canada (NCERC), the Social Sciences and Humanities Research Council (SSHRC), and the Medical Research Fund of New Brunswick. The amounts received from these sources for the past two academic years were as in figure 13.4

Figure 13.3 Research Grants Received

Foundation	Amount Received 1998-99	Amount Received 1999-00
NSERC	$539,634	$476,591
SSHRC	$173,821	$127,252
MRF	$17,367	$17,000

Each of the professors applies for research funding on an individual basis. It is therefore difficult to pinpoint the nature of the various research projects being conducted on campus. A number of professors do focus on the environment. In the Sciences, most environment-related research takes place in the Biology and Geoscience departments. These are some of the projects that were facilitated in the last two years:

Professor:	**Project:**
Dr. Jeff Ollerhead	marine nearshore tidal erosion processes
Dr. David Mossman	geological processes
Dr. Irena Kaczmarska	marine plant ecology and effects of UV radiation on freshwater plankton
Dr. Doug Campbell	effects of UV radiation on aquatic plants and microorganisms
Dr. Felix Baerlocher	effects of disturbances on aquatic fungi
Dr. Robert Ireland	nitrogen metabolism in tidal marsh plants
Dr. Ron Aiken	community ecology of freshwater insects and marine invertebrates

Funding for these projects was primarily through NSERC. Appendix A of this foundation's application form asks for a description of the "Anticipated Environmental Impact" and "Mitigation of the Anticipated Environmental Impact". Researchers are required to fill out this portion of the application if their research has a known environmental impact, uses hazardous substances, involves field work, or if it takes place in a marine environment. This allows for a certain measure of environmental screening on the part of the foundation. Additional significant sources of funding for science research at Mount Allison include Environment Canada., Canadian Foundation for Innovation (CFI), and the New Brunswick Heart and Stroke Foundation[3].

In the Social Sciences and Humanities, the bulk of outside funding for research comes from the Social Sciences and Humanities Research Council. There are fewer projects with environmental focus in these departments than in the sciences, however. Projects that received SSHRC funding in the 1998-99 and 1999-00 academic years include, "Traditional Circumpolar Ecological Knowledge", "Change in Inland Aboriginal Fishery", and "Municipal Wastewater Treatment"[4].

University Procurement

The procedure for making purchases using university funds is essentially the same as it was at the time of the last audit. A request form is submitted to Financial Services. Once the request has been approved, a purchase order is placed with the

[3] Information obtained from Dr. Jean-Guy Godin, Dean of Science, Mount Allison University, August, 2000.

[4] Information obtained from Dr. Patrick Baker, Dean of Social Science, Mount Allison University, August, 2000.

specified company and the invoice paid following the delivery of the product to the end user. Roughly 4000 request forms are processed through the purchasing department each year.

The university purchasing policy has not changed since 1998. The auditors were informed that currently no formal policy exists within the purchasing department to govern purchasing on environmental grounds. However, informal control is exerted by the department to ensure that things such as energy efficiency are taken into account when departments purchase equipment. Thus, suggestions are limited to the purchasing manager's knowledge of environmentally friendly alternatives.

The percentage of survey respondents in favour of a policy that allowed for the purchase of environmentally friendly products that were more expensive than the unfriendly alternative are as follows: 32% of respondents favoured a policy that allowed for a 10% increase in price, 46% favoured a policy that allowed for a 5% increase, 19% favoured a policy that allowed for the purchased of products equal in price, and 3% favoured various other purchasing policies. These numbers indicate a relatively strong willingness on the part of the university community to increase the amount of spending for the sake of the environment. It also indicates support for the policy which currently governs this increase.

The university has standing contracts with a wide variety of companies for items purchased on a regular basis. Common items that are price-sensitive to volume or large quantities are purchased through an cooperative tenders with other universities within the Maritimes. Wherever possible, the university standardizes specifications for frequently purchased equipment such as computers and printers. The choice of supplier frequently results from a competitive process or government contract that emphasizes quality, price and service issues. Over the past year, university tenders that followed the public tendering process contained a request for information on the environmental practices and policies of bidding companies, although this was by no means the deciding factor in awarding a contract.

Financial Services actively evaluates order placement and invoicing systems for efficiency and value. Current contracts with Grand and Toy for office supplies and Dell Computer Corp. for personal computers employ internet order processing. Under the Grand & Toy agreement, departments prepare and forward requests for supplies to Grand and Toy through the internet. The process reduces the amount of paper used in the process by both university and supplier. Though these suppliers were selected primarily for the quality specifications, supplier service and financial benefits, they result in reduced paper use in ordering, invoicing and packaging.

The university has standing contracts with a wide variety of companies for items purchased on a regular basis. Items ordered in large quantities are purchased through an inter-university tender. This tender includes all Maritime universities. Casual purchases do not require a contract and are generally bought from the supplier that offers the lowest price.
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Figure 13.5 lists the university's top ten suppliers and their environmental policies.

Figure 13.4 Major Suppliers and Environmental Conduct

Company/ Organization	Product	Environmental Policy
Blue Cross	Insurance	No information available
Cardinal Construction	Construction	Cardinal Construction does not have an environmental policy
CIBC Mellon	Financial Services	No information available
Dell Computer Corporation	Computers	Dell's environmental policy can be found at http://www.dell.com/us/en/gen/corporate/vision_003_environ.htm
Imperial Oil	Heating Oil	Imperial Oil's environmental policy can be found at http://www.imperialoil.ca/community/environ 2.htm
Jones Masonry	Stone Work	No information available
Sodex'ho Alliance	Food Services	No information available
NB Power Commission	Electricity	NB Power's environmental policy can be found at http://www.nbpower.com/en/enviro/ performancereport/Envir_E_corp.pdf
Sun Life of Canada	Life Insurance	No information available
Town of Sackville	Water	The Town does not have an environmental policy.

University Investments

The University's long term financial investments are in its General Endowment Fund, approximately $55 million; the Bell Endowment Fund, approximately $20 million; and a defined benefit pension plan fund, approximately $12 million. The endowment funds support the university by providing scholarships for students, funds for academic departments, funds for the maintenance of facilities, and so on. The purposes for which the funds can be used were, in most cases, specified by the donors. The pension plan fund provides pensions for non-academic staff of the University.

The University's Board of Regents, on recommendations from its Investment Committee, sets investment policies and appoints investment managers for the General Endowment and pension funds. The Investment Committee also monitors the performance of these managers. The Bell Endowment Fund Committee has purview over the Bell Endowment Fund.

The assets of these funds are held by CIBC Mellon and Royal Trust and are managed by the Common Fund for Nonprofit Organizations, Barclays Global Investors, and Jarislowski Fraser. About 65% of the investments are in bonds, with the remainder in Canadian, US and non-North American equities.
More than 75% of the investments are in pooled funds and almost 50% in index funds.

The nature of the Mount Allison's investment portfolios and management is such

that it is nearly impossible to trace the environmental or social accountability of the end companies being supported by the university's investment. Ethical Investment funds and managers are one way to bridge this gap. Ethical Investments promote selective investment based on the environmental and social practices behind the commodities represented by market values. Ethical Investment managers create portfolios of companies that have passed an ethical screening process. Currently, Mount Allison does not employ an Ethical Investments manager, however one of the managers of the university's Common Fund investments is working to create a portfolio of environmentally and socially responsible corporations.[5]

In the spring of 2000, the Students' Administrative Services V.P. Finance, Ted Rutland, produced a report entitled "Aligning Investment with Mission: The Case for Mission-Based Investing at Mount Allison". This report outlines the history and rationale behind screening investments to ensure that they align with the investor's mission. In the case of a university such as Mount Allison, it is critical that investments reflect the social and environmental lessons taught in courses, as well as upholding the university's "espoused virtues of morality and altruism"(p.4). The fourth chapter of the report gives retroactive proof of how the university might have gained by screening out six of the corporations in their investments portfolio that did not match the institution's mission. It was proved that Mount Allison would have had on average, a 3 percent higher return each year of screening between 1994 and 1999. The report ends with a proposed missions-based investing policy that could be adopted by the Board of Regents University Investment Committee. The report is scheduled to be presented at the next Board of Regents meeting this fall. Any action on this front will depend on how the report is received by the committee.

In response to the survey, 60% of respondents indicated their support for Ethical Investments. 14% answered no, while 26% answered non applicable. Most of these people included a statement saying they did not know enough about the concept to answer one way or the other. Should the university pursue an Ethical Investments manager, information on the rationale and benefits of this decision should be made available to the public. It is very likely that with a better understanding of this new form of management, most members of the university community would give their support.

[5]Information obtained from David Stewart, Vice President Administration, August 2000.

Case Study

In 1987 the Associated Students of UCLA developed a policy allowing anyone from the campus community to scrutinize the companies with whom ASUCLA did business. As a result in 1989, they stopped purchasing *General Electric* products because of their numerous environmental violations.

Recommendations

For Senior Administration:

1. Buy only those products which meet or exceed the standards outlined by the National Ecologo labelling system.. Products certified by the Ecologo system "are proven to have less of an impact on the environment because of how they are manufactured, consumed or disposed of. Certification of products and services is based on compliance with stringent environmental criteria that are established in consultation with industry, environmental groups, and independent experts." (http://www.environmentalchoice.com/index_main.cfm)

2. Sign the Valdez Principles and abide by them in all business transactions (see Appendix U for the Valdez Principles)

3. Conduct a comprehensive environmental and social audit of all university investments and provide a unified investment portfolio for the public.

4. Conduct a comprehensive audit of all donor corporations and foundations from whom the university accepts financial support and make this information available to the public.

5. Establish a unified list of all the companies with whom the university has contract agreements and make this information available to the public.

6. Establish an Environment Purchasing policy demanding the following:
   - recycled, non toxic and renewable product alternatives be favoured by the purchasing department whenever the product is less than 5% more expensive than its conventional alternative.
   - full disclosure of environmental practices and policies be provided by companies under contract.
   - university investments be restricted to investment funds with

commitments to pursue environmental responsibility.

- funding provided by environmentally responsible sources be favoured by the university.
- all funding sources provide full disclosure of any environmental policies and declare any conflicts of interest between the environment and funding sources.

Figure 13.5 Review of Current Environmental Policy

Current Performance Indicators	Current State of Affairs	Proposed Changes to Performance Indicators
Photocopiers and printers minimize the required use of paper.	Under the new contract agreement with Canon most of the printers and photocopiers on campus will have double-sided printing/copying as a default.	No change proposed.
Recycled and post-consumer paper is purchased.	Number 5 paper contains 30% post-consumer and 20% pre-consumer content. Coloured papers contain 30% post-consumer content.	No change proposed.
Unbleached recycled paper is available in the Bookstore.	Recycled paper is available at the Bookstore	No change proposed.
In the purchase of products, the following factors are taken into consideration: a) reduced packaging; b) environmental performance (i.e. energy saving), c) reduced consumption; d) construction (i.e. recycled materials rather than tropical hardwoods, PVC); and longevity.	Energy efficiency, and longevity are taken into account in the purchase of products for financial reasons. Recycled building materials are used if stipulated in the contract. Reduced packaging is not currently a priority in purchasing decisions.	No change propsosed.
Information is provided to departments comparing the environmental performance of different products. I.e. Fax machines that can use recycled paper, etc.	This information is provided only when the purchasing manager is aware of alternatives.	A mechanism for making this information available to the end users of products ordered should be added as part of this performance indicator so as to clarify at what level this information is obtained.

Letter Grade: D

Education

Introduction

A number of both academic and extracurricular programs at Mount Allison seek to educate students on environmental issues. The university curriculum offers a number of courses with some degree of environmental content. As environmental issues become recognized as contemporary concerns, the number of courses with environmental and ecological concepts has increased. The Environmental Studies and Environmental Science majors have been established since the last audit. The construction of the new Coastal Wetlands Research Facility this year will enable further environmental research as well as partnerships between the university and the local community, thus contributing greatly to the implementation of the Environmental Policy in the Curriculum section. In addition, initiatives led by the Blue Green Society and by the Green Ambassadors have served to educate the university community on environmental issues.

Environmental Significance

The world is currently faced with a vast array of environmental challenges. Among these are the pollution of oceans and rivers, deforestation, water shortage and the threat of global climate change. If these problems are to be addressed, it is necessary that citizens be well educated on environmental issues. Universities have an important role to play in this process. Universities are "leaders in education, innovation, research, and information distribution." [1] Furthermore, universities bring together those with academic expertise and students who represent future citizens and decision-makers. As such, universities have a unique opportunity and a responsibility to act as leaders in environmental sustainability. Given the pervasive nature of environmental problems, all university graduates should have at a least a basic understanding of these issues. By learning about the causes, consequences and possible solutions to environmental degradation, students are better prepared to address these problems.

Current Environmental Policy

"The University encourages faculty and senate to consider, where appropriate, taking steps to incorporate environmental content throughout existing curriculum, increasing environment related course offerings and programs seeking more resources to dedicate to environmental research"

The performance indicators for this section of the policy are as follows:

- "Cases and examples derived from the audit or other on campus environmental work are incorporated into course-work.
- Local- community resources such as Canadian Wildlife Services are utilized, and local regional issues are integrated into course work.

[1] Sierra Youth Coalition Sustainable Campuses Resource Package p.4

- An environmental certificate acknowledging that a student is graduating with an understanding of environmental issues, resulting from taking a certain number of related courses, is awarded upon graduation.

- Speakers, presentations, debates and other such methods are utilized to educate students on environmental topics."(Section 2.1, Mount Allison University Environmental Policy, www.mta.ca/environment)

Responsible Parties

The University Senate is responsible for making decisions regarding academic affairs.

Audit

There have been a number of changes in environmentally-focused academic offerings since the last audit was conducted. The university currently offers interdisciplinary minor and major programs in Environmental Studies and Environmental Science. In 1998, the Environmental Studies program was limited to a minor consisting of 24 credits to be selected from courses in the Geoscience, Geography, Economics and Philosophy departments. Starting in the 1999-2000 academic year, a major in Environmental Studies was offered in the course calendar. This program is comprised of 72 credits from courses in arts, science, and social science. A mandatory fourth year seminar course is currently being built as a capstone for the degree. A complete description of the requirements for both major and minor in this program is contained in Appendix V. This past year, a director's position for the environmental studies program was created. This hiring is critical to the development of both major and minor as it will help to ensure that the programs are shaped as individual degrees and not only as a collection of courses from other departments.

The Environmental Science program has undergone significant change since the last audit. Prior to that time, the program existed as the Environmental Science Double Major. In the spring of 1998 it was dropped from the course calendar because it was considered to be an inadequate combination of courses with an overly demanding course load. The program was revised and reintroduced in the 1999-2000 academic year as an interdisciplinary major consisting of 84 credits. Students are required to complete a core set of courses from sciences, geography, philosophy and economics and focus on either the Natural, Physical or Chemical Sciences Stream. A complete description of the requirements for the major is contained in Appendix V.

In the university's Environmental Policy, two curriculum performance indicators are "[c]ases and examples derived from the audit or other on campus environmental work are incorporated into course-work." and "Local- community resources such as Canadian Wildlife Services are utilized, and local regional issues are integrated, into course work." While individual professors may take advantage of campus or community resources in their classes, this has not been formalized in any way. To facilitate the integration of local resources into course work, a database could be established with contact details and other relevant information for each organization, possibly on the Mount Allison website.

The Coastal Wetlands Research Facility currently being built between the Barclay and Flemington buildings will undoubtedly promote utilization of Canadian Wildlife Services in course work at Mount Allison. The funding for this facility was provided by the Canadian Foundation for Innovation (CFI) following an application made by several faculty members from science and social sciences, the Canadian Wildlife Service, Environment Canada, and Atlantic Canada Opportunities Association. The building will house new research equipment and will facilitate environmental research partnerships between Mount Allison, the local community, and the federal government. Faculty and undergraduate research will thus take on an environmental focus in the future. Though in the past, Mount Allison has not taken full advantage of its close proximity to the Canadian Wildlife Service's Atlantic regional office, it is hoped that the facility will serve not only as a

research station but as a means of bridging the gap between governmental and university-based studies in this area. This can in turn provide the model for work on local environmental concerns through a research station that allows the gathering and analysis of Sackville and Tantramar specific data.

There are a number of courses currently offered that either include some environmental content or focus specifically on environmental issues. With the exception of Geography 3101, Environment and Development, which was introduced this year, all courses have been listed for at least the past two years. See figure 14.1 for environmental course listings for 2000-2001.

Figure 14.1

Environmental Courses	Environmental Content
Chemistry 3011 Environmental Science 4903 Environmental Studies 4000 Geography 2101, 3101, 3201, 4101 Geoscience 2031 Philosophy 1651, 3721 Sociology/anthropology 2501, 3611, 4521	Biology 1211, 2101, 3011, 3501, 3551 Canadian Studies 3400 Chemistry 1501 Commerce 3371 Economics 3551, 3801, 3821 Geography 1201, 2221, 2311 Geoscience 1001, 2101 History 3360 Philosophy 3511 Religious Studies 1651, 3911, 3921 Sociology/anthropology 3021, 3621

Courses dealing specifically with environmental issues are available in chemistry, geography, geoscience, philosophy and sociology/anthropology. Three of a total of ten courses are at the first or second year level. In total, out of 28 academic departments, 11 offer courses with at least some environmental content. The Director of Environmental Studies hopes to cross-list a number of the current environmental courses in an effort to "green" other departments. For example, the fourth year geography seminar "Seminar in Environmental Issues" focuses on international environmental policies and could easily be listed as an International Relations course. It is hoped that by including such courses in the offerings for other departments, faculty in these disciplines will consider increasing the environmental content of all courses in that department.

When asked, in the Environmental Audit Campus Questionnaire, if faculty members felt that their "knowledge of environmental issues is adequate to incorporate environmental concepts into your daily teaching", 16 of 28 respondents said yes. When asked if they "incorporate environmental content into any of your teaching material", 15 out of 29 said yes.

The Strategic Plan for the university will likely prove to play a role in shaping the nature of environmental education within the academic curriculum. Among other things, the plan will determine the direction of academic hiring and the development of various programs. One of the performance indicators for the Curriculum section of the Environmental Policy states that "An environmental certificate acknowledging that a student is graduating with an understanding of environmental issues, resulting from taking a certain number of related courses, is awarded upon graduation.". While there has been no action on this front since the policy was written, senior administration and academic deans will be discussing the creation of such a certificate when developing their plan of action for implementing the Strategic Plan.

The Millennium Chairs fund is a federally sponsored program that grants multi-year funding to universities for the purpose of hiring researchers. It is a two tiered system, granting positions to both senior and junior researchers. Mount Allison has been allocated funds to hire one senior researcher and four junior researchers over the next five years. The departments receiving these chairs have not yet been determined, as they will play an integral role in the Strategic Plan for the future

direction of the university. Should one of the academics hired have a background in environmental science and/or studies, environmental education stands to improve with research specific to these fields of expertise.

The Blue Green Society has carried out a number of awareness campaigns designed to educate the campus community on environmental issues. During the 1999-2000 academic year, this included campaigns on the World Trade Organization and climate change. In 1998-1999, attention focused on the New Brunswick Protected Areas Strategy and Earth Day. In addition, society meetings, which are open to all members of the university, provide a forum for environmental speakers and presentations on a wide range of topics.

Two separate initiatives have been taken to promote the university's Environmental Policy passed in May, 1999. During Orientation Week in September 1999, the policy was introduced to frosh through "Green Orientation" events, which included handing out reusable mugs, providing china and a mug washing station at the outdoor barbecue, a presentation on the policy at Convocation Hall, and handing out environmentally friendly living tips at registration. These events were designed to raise the profile of the policy and impress upon new students the idea that Mount Allison is working toward becoming a leader in environmental excellence. In February 2000, three students were hired to act as Green Ambassadors. The primary responsibility of this job was to publicize the policy among students, staff and faculty. 55 per cent of survey respondents claimed to be familiar with either the Environmental Policy or the last Environmental Audit. As these two documents become further integrated into the decision making process at Mount Allison, it is predicted that the level of familiarity will increase. Of the staff, students and faculty who responded to the survey question "Do you feel you are adequately educated on environmental issues?", only 34.5% responded yes. This suggests that a large portion of the university community still need to be educated on environmental issues in general and on specific initiatives undertaken on the Mount Allison campus.

Case Study

Widener University in Chester, Pennsylvania has introduced a course on campus environmental issues for first year students entitled "Campus Ecology and Environmental Stewardship". The course covers a wide range of topics including "energy and water use, purchasing, dining services, solid and liquid wastes". Students study environmental initiatives on other campuses and carry out a research project in which they examine "campus operations at Widener University and explore solutions that both reduce environmental costs while also reducing campus operations costs". The course aims to instill in students "a set of learning outcomes that match key components of urban ecological literacy." (http://www.science.widener.edu/~grant/courses/campus.html)

Recommendations

For Senior Administration:

1. Appoint an environmental literacy task force to work towards the implementation of the following recommendations:

2. Include the statement "all students, upon graduating, will possess the knowledge, skills, and values to work towards an environmentally sustainable future" (Blueprint for a Green Campus) as part of the university's mission statement.

3. Develop a mandatory first year course, which would focus on the problem of environmental degradation and, more importantly, the possible solutions. This course would focus on students' individual responsibility for the environment and provide them with the tools needed to be environmentally responsible citizens. The course could also include a section on the environmental impacts of campus life and methods to reduce that impact.

4. Introduce a “Green Certificate” program similar to one currently used at Princeton University. This certificate would be awarded to all students who have successfully completed the mandatory first year course on the environment (once implemented) as well as one other course with a focus on environmental issues. Other methods of earning the certificate might include the completion of two courses with environmental focus, or one with environmental focus and two others with significant environmental content etc. This certificate would be included with the student’s diploma upon graduation.

5. Encourage faculty to incorporate and highlight environmental content in their courses.

6. Sign and abide by the Talloires Declaration (see Appendix W).

7. Hire a professor with a background in Environmental Studies to fill at least one of the five research chair positions funded by the Millennium Chairs fund.

For Faculty:

8. Organize workshops for faculty in all relevant disciplines that teach professors how to “green” their courses. This could be done with the help of an organization such as Second Nature, which provides training to faculty so that students will be environmentally literate when they graduate.

9. Research environmental issues applicable to your field and “green” first year courses with high enrollment.

10. When discussing an environmental problem in class be sure to carry through on the subject by informing students of actions they can take. For example: while discussing global warming in geoscience class, be sure to mention that turning off lights and computers when not in use and walking or cycling rather than driving can help to reduce the greenhouse effect. These suggestions may seem obvious, but it is only through the constant reinforcement of these actions that they will become imbedded.

For Students:

11. Take the initiative to educate yourself on environmental issues through books, newspapers, television etc.

12. Encourage faculty to “green” their courses through questions and comments in class.

13. Invite guest speakers to your society meetings to discuss relevant environmental issues. For example, the commerce society could have someone speak about environmental cost analysis.

14. Organize and advertise an event such as a Mount A Earth Day to educate fellow students on environmental issues.

15. Teach by example, bring a reusable cup when you get coffee and a reusable bag to the grocery store.

Figure 14.2 Review of Current Environmental Policy

Current Performance Indicator	Current State of Affairs	Proposed Change to Performance Indicator
Local- community resources such as Canadian Wildlife Services are utilized, and local regional issues are integrated, into course work.	This is dependent both on the professor's knowledge of local and regional issues and on the nature of the course being taught. Neither the audit, nor The Canadian Wildlife Service facility are used extensively in course work.	Add an indicator and target date for specific courses where this material could first be incorporated and an indicator stating that the professors of these courses will be granted the information needed to expand their curriculum.
Cases and examples derived from the audit or other on campus environmental work are incorporated into course-work.	Such examples are dependent on the professor's familiarity with the audit document and campus environmental work and their relevance to the course.	Add an indicator and target date for specific courses where this material could first be incorporated and an indicator stating that the professors of these courses will be granted the information needed to expand their curriculum.
An environmental certificate acknowledging that a student is graduating with an understanding of environmental issues, resulting from taking a certain number of related courses, is awarded upon graduation.	This certificate has not yet been developed.	Set target dates for development and first receipt of this certificate
Speakers, presentations, debates and other such methods are utilized to educate students on environmental topics.	Some of the speakers for the President's Leadership Series are environmentalists. An environmental speakers series was organized for the spring of 1999 but had to be cancelled as a result of the MAFA strike that semester.	No change proposed.

Letter Grade: B

Survey Responses

To increase awareness concerning the environmental practices and beliefs of the university community, and to assess any change in this level of awareness since the 1998 audit and the passing of the Environmental Policy in 1999, a survey was sent out to all staff, faculty and students in May via mass E-mail. The survey and its results are as follows:

Environmental Audit
Campus Questionnaire

This summer Mount Allison University has hired three students to conduct a comprehensive environmental audit on campus. In order to provide the auditors with a better idea of environmental issues on campus, the faculty, staff and students are asked to complete this short, easy survey. We hope you will take the time to answer each question as honestly as possible. To complete the survey type an X in the appropriate space or fill out your response. Please answer only the questions that are relevant to you.

To return the completed survey by E-mail, send the attachment to enviroaudit@mta.ca. If you wish your response to be anonymous, surveys can be printed and returned to box #304, however, all responses will remain confidential. Thank you for your help.

1. Are you familiar with the university's Environmental Policy, which was approved in May, 1999 ?

[ ] Yes [ ] No

119 respondents
yes: 66
no:53

2. Are you familiar with the university's first Environmental Audit, conducted in 1998 ?

[ ] Yes [ ] No

114 respondents
yes: 63
No: 51

3. What method of transportation do you most commonly use to commute to work/class every day ?

[ ] Car [ ] Bicycle [ ] Foot

119 respondents
car: 33
bicycle: 5
foot: 74
combination: 7

4. Do you car-pool regularly ?

[ ] Yes [ ] No [ ] N/A

114 respondents
yes: 11
no: 29
NA: 74

5.Would you be interested in car-pooling ?

[ ] Yes [ ] No [ ] N/A

118 respondents
yes: 19
no: 25
NA: 74

6. Would you participate in a communal bicycle programme (similar to the UBC Trek programme), as an alternative to driving, in the municipal region of Sackville ?

[ ] Yes [ ] No [ ] N/A

108 respondents
yes: 32
no: 22

NA: 54

7. How far do you live from campus ? (Km)
113 respondents
on: 14
<5: 83
<20: 6
>20: 12
average: 5.63km

8. Would you use unbleached and/or recycled paper if it was offered ?
[ ] Yes [ ] No
118 respondents
yes: 116
no: 2

9. Would you support a university purchasing policy which favoured environmentally friendly products, equal in quality to the unfriendly alternative, at a cost;
[ ] 10% more expensive
[ ] 5% more expensive (as per the current policy)
[ ] Equal in price
[ ] Other
112 respondents
10%: 36
5%: 52
equal: 21
other: 3

10. Would you prefer the university invest in "Ethical Investment" funds over standard investment funds ? Please comment.
[ ] Yes [ ] No [ ] N/A
97 respondents
yes: 58
no:14
NA: 25
**Those who responded no or NA often cited lack of knowledge on the ethical investments concept as their rationale.*

11. Do you support the spraying of the campus with herbicides in order to maintain a weed free campus ?
[ ] Yes [ ] No
119 respondents
yes: 22
no: 97

12. Do you feel you are adequately educated on environmental issues ?
[ ] Yes [ ] No [ ] N/A
99 respondents
yes: 34
no: 65

13. Would you consider the ventilation, heating and cooling in the building you work/live in on campus to be: (please indicate the name of the building that you work/live in)
[ ] Very poor
[ ] Poor
[ ] Fair
[ ] Good
[ ] Excellent
Building:
99 respondents
very poor: 23
poor: 27
fair: 25
good: 17
excellent: 7
Most of the complaints came from the Library and Barclay, although no

building received a majority of the 'poor' or 'very poor' responses.

14.Do you support the introduction of alternative energy sources (wind turbines, solar panels, et cetera) as a means of supplementing the current energy sources used on campus ? Why or why not.

[ ] Yes [ ] No

118 respondents
yes: 116
no: 2
** A number of respondents stipulated that they would only support alternative energy sources that were economically feasible for the university.*

15. What areas of wastage do you see in your department and around campus ?

Paper, water, and electricity were cited most often.

16. Please identify any ways you know of to reduce water wastage on campus.

Composting toilets, and low flow fixtures were often cited.

17. Do you feel you have an adequate understanding of recycling on this campus ? Please comment.

[ ] Yes [ ] No

118 respondents
yes: 52
no: 66

18. How would you rate the disposal methods for hazardous wastes on this campus ? Please comment further if there are hazardous wastes that are specific to your department.

[ ] Very poor
[ ] Poor
[ ] Fair
[ ] Good
[ ] Excellent

44 respondents
very poor: 2
poor: 2
fair: 17
good: 18
excellent: 5
** Many people were not well-versed on the disposal methods for hazardous waste or were not aware of any such materials being used in their department.*

19. What ideas do you have to improve the environmental practices of this university ?

There were very few responses to this question.

20. Do you have any suggestions for this year's auditors, beyond the questions asked in this survey?

There were very few responses to this question.

Food Services (only applicable to those who use the meal hall or the Golden A Café)

1. Would you eat organic food were it offered ?

[ ] Yes [ ] No

61 respondents
yes: 54
no: 7

2. Are you vegetarian ?

[ ] Yes [ ] No

63 respondents
yes: 12
no: 51

3. If so, do you feel there are adequate vegetarian options available ?

[ ] Yes [ ] No
12 respondents
yes: 0
no: 12

4. Do you support the use of reusable containers, and/or reduced packaging overall in food services on this campus ?
[ ] Yes [ ] No
60 respondents
yes: 59
no: 1

Faculty only
1. Would you accept assignments via E-mail from students ?
[ ] Yes [ ] No [ ] N/A
29 respondents
yes: 17
no: 11
NA: 1
** Those who responded no often cited difficulty reading off the computer screen and difficulty making comments without a hard copy as rationale.*

2. Would you accept assignments double sided from students ?
[ ] Yes [ ] No [ ] N/A
30 respondents
yes: 27
no: 2
NA: 1

3. Would you accept assignments on one-sided paper (paper which has been used on one side) from students ?
[ ] Yes [ ] No [ ] N/A
26 respondents
yes: 22
no: 2
NA: 2

4. Would you support a departmental purchasing policy which favoured environmentally friendly products, equal in quality to the unfriendly alternative, at a cost;
[ ] 10% more expensive
[ ] 5% more expensive
[ ] Equal in price
[ ] Other
26 respondents
10%: 12
5%: 9
equal: 4
other: 1

5. Do you feel your knowledge of environmental issues is adequate to incorporate environmental concepts into your daily teaching ?
[ ] Yes [ ] No [ ] N/A
28 respondents
yes: 16
no: 7
NA: 5

6. Do you incorporate environmental content into any of your teaching material ?
[ ] Yes [ ] No [ ] N/A
29 respondents
yes: 15
no: 8
NA: 6

7. What initiatives have you or your department taken to decrease your environmental

impact ?
Answers included reusing paper, recycling, introducing more courses with environmental content, placing material on the departmental website instead of printing it, and using email for communications.

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Appendix A-Building Renovations

					Renovations Prior to 1998 Audit		Renovations Since 1998 Audit	
Building	**Use**	**Date Built**	**Floor Area**	**Basement Floor Area**	**Date of Renovations**	**Renovation Type**	**Date of Renovations**	**Renovation Type**
Flemington	Labs/Class	1933	32010	3261	92,93,94	interior upgrade	1998, 99	lab renovation, stone renovation, roof repair
CLT	Office/Class	1958	10246	2895	1998	int. and ext.		
Con Hall	Auditorium	1966	48565	9711	1997	ext. brick replacement	1998	recaulking
Crabtree	Offices/Classes	1979	43505	10876			1998	exterior stonework rehab.
Fawcett	Support Services/Bookstore	1960	7950	7950	1997	roof replacement/int. upgrade		
Gairdner Fine Arts	Studios	1965	14593	4892	1989		1998, 99	upgrade ventilation system, exterior structural repairs
Harper	Residence	1964	44000	11000			1998	ceiling replacement, balance ventilation system
Hunton House	Residence	1958	20500	5130				
Jennings	Dining Hall	1965	16685	16685			2000	complete renovation
MacGregor	Residence	1920	3100	900				
Monastery	Residence	1920	9200	3100			1999	roof replacement
Owens Art Gallery	Gallery	1900	22546	8245	1997	ext. stone maintenance	1999	frieze restoration, flat roof replacement
Palmer	Residence	1934	24343	6319	1997	electrical panels	1999	ceiling replacement
President's Cottage	Offices/Dining	1910	6468	1325				
Allison Gardens	Arena	1946	25000	3200				
Sprague House	Offices	1900	3200	900				
Thornton	Residence	1968	24800	6200			1999	interior painting and flooring, ceiling replacement, firedoors
University Centre	Offices	1928	36446	10716	1958	addition	2000	masonry repairs
Windsor Hall	Residence	1962	59650	12050			1998	interior painting and flooring
Library	Library	1970	76245	34320	1996	stairwells and fire doors	2000	reinstate air conditioning
PEG	Offices/Labs	1957	34220	9859	1996	Wu Centre construction	2000	complete renovation*
Trueman/Tweedie/McConnell	Residence/Dining Hall	1946	76000	37000	1963	addition of dining hall	1999	sanitary sewer pipe repair
Athletic Center	Athletics	1968	53169	5302	1996	replaced ext. pool windows	1998	renovations, building envelope repairs
Avard Dixon	Offices/Classes	1958	36073	9641	1994	gutted and retrofitted	1999	sink installment
Barclay	Offices/Labs	1968	57856	15710			1999	roof replacement, int. finish, reno. labs 11-13, repair vent.
Baxter House	Offices	1900	3566	925			1998	electrical upgrade
Cranewood	Private Home	1836	7000	1500			1998	flooring, sewer line replacement
Bennet House	Residence	1958	20100	5025			1998	replace roof
Bermuda House	Residence	1920	10140	2220	1995	struct. reinforcement and lounge		
Bigelow House	Residence	1958	20100	5025			1999	upgrade washroom
Black House	Offices	1920	10025	2965				
Carriage	Residence	1920	3303	1128	1986	interior renovation	1999	replace siding and roofing
Anchorage	Offices	1920	5435	1358.75				
Centennial Hall	Offices	1883	17442	4791	1996	complete interior renovation	1998	ventilation in Financial Services
Chapel	Religious Ceremonies	1965	10428	4258	1997	canopy replacement	1999, 2000	renovate stained glass, flooring, plaster, masonry repointing and repairs
Colville House	Residence	1920	3500	1500				
Conservatory	Offices/Conservatory	1966	31166	12140			2000	masonry repairs, replace flat roof, waterproof foundation
Cuthbertson	Residence	1920	5200	500				
Edwards	Residence	1968	24800	6200				
Facilities Management	Physical Plant/Offices	?	11481	8697	1996	new roof and floor		
Hart Hall	Offices/Classes	1920	7750	1550	1983	interior upgrade		
Rectory Lane House	Studios	1940	3000	1000			2000	decommissioned
Hillcrest	offices	1880	3060					

*work in progress at time of auditing

Appendix B-Building Materials

Building	Structure	Ext. Wall	Roofing
Flemington	Concrete	Stone	Asphalt shingles
CLT	Concrete/Steel	Masonry Block	Asphalt shingles
Con Hall	Concrete	Masonry Brick	Asphalt shingles
Crabtree	Reinforced Concrete	Stone	Inverted
Fawcett	Steel	Siding	Steel
Gairdner Fine Arts	Reinforced Concrete	Stone	Flat roof
Harper	Steel and concrete	Brick	Flat roof
Hunton House	Steel and concrete	Brick	Flat roof
Jennings	Reinforced Concrete	Brick	Flat roof
MacGregor	Wood	Wood siding	Asphalt shingles
Pavillon Bousquet	Wood	Brick	Asphalt shingles
Owens Art Gallery	Concrete	Stone	Asphalt shingles
Palmer	Reinforced Concrete	Stone	Asphalt shingles
President's Cottage	Wood	Wood siding	Asphalt shingles
Allison Gardens	Steel	Masonry Block	Asphalt shingles
Sprague House	Wood	Wood	Asphalt shingles
Thornton	Steel and concrete	Brick	Asphalt shingles
University Centre	Reinforced Concrete	Stone	flat and shingled
Windsor Hall	Reinforced Concrete	Brick	Flat roof
Library	Reinforced Concrete	Stone	Inverted
PEG	Reinforced Concrete	Stone	Flat roof
Trueman/Tweedie/McConnell	Concrete	Stone	Asphalt shingles and inverted
Athletic Center	Reinforced Concrete	Masonry Brick	Flat roof
Avard Dixon	Steel	Stone	Asphalt shingles
Barclay	Concrete	Stone	Flat roof
Baxter House	Wood	Wood siding	Asphalt shingles
Cranewood	Wood	Stone	Asphalt shingles
Bennet House	Steel and concrete	Brick	Flat roof
Bermuda House	Wood	Wood siding	Asphalt shingles
Bigelow House	Steel and concrete	Brick	Flat roof
Black House	Wood	Wood siding	Asphalt shingles
Carriage	Wood frame	Wood siding	Asphalt shingles
Anchorage	Wood frame	Wood siding	Asphalt shingles
Centennial Hall	Concrete	Stone	Asphalt shingles
Chapel	Concrete	Stone	Flat roof
Colville House	Wood frame	Wood siding	Asphalt shingles
Conservatory	Reinforced Concrete	Stone	Flat roof
Cuthbertson	Wood frame	Wood siding	Asphalt shingles
Edwards	Steel and concrete	Brick	Flat roof
Facilities Management	Steel	Masonry Block	Asphalt shingles
Hart Hall	Reinforced Concrete	Stone	Asphalt shingles
Rectory Lane House	Wood frame	Wood siding	Asphalt shingles
Hillcrest	Wood frame	Wood siding	Asphalt shingles

Appendix C-Energy Consumption for June 1998-May 2000

BUILDINGS		Sprague	Hess	Cuthbert	Bousquet	Fawcett	Colville	Baxter	McGregor	Cdn. studies	Crane*	Carriage*	Bermuda*	Phys.Pl.*	Heat Pl.	Hillcrest	Rink	Farm	Daycare	Bl.House	Total cost/month	Total kwh/month	Cost/year	kwh/year
	1998																							
JUNE	Cost	139.81	42.14	192.31	335.94	524.22	88.81	143.2	138.79	78.36	99.4	180.32	481.21	48557.26	162.81	154.23	370.68	33.19	121.98	177.01	52021.67			
	kwh	2007	390	2809	2880	4960	997	2007	1925	690	1256	2760	5040	640000	1600	2275	3840	28	1160	1753		678377		
JULY	Cost	106.24	78.57	117.42	294.32	372.28	84.24	109.63	120.6	63.89	128.3	196.36	534.7	46666.86	147.96	94.72	303.87	34.04	88.57	157.89	49700.46			
	kwh	1383	901	1417	2400	3840	933	1383	1587	534	1276	2541	5200	618000	1440	1169	3120	40	800	1547		649511		
AUGUST	Cost	80.82	74.72	101.61	637.94	311.29	71.12	98.43	114.34	76.88	122.27	164.99	502.74	45810.74	147.96	89.77	303.87	34.26	88.57	151.49	48983.81			
	kwh	680	847	1123	1470	3200	749	1238	1470	674	1164	1958	4880	606400	1440	1077	3120	43	800	1478		633811		
SEPTEMBER	Cost	166.2	72.65	184.89	643.25	562.85	122.97	108.44	139	139.24	206.69	204.91	847.1	75967.77	162.81	145.19	695.18	35.61	118.27	186.2	80709.22			
	kwh	1600	818	2671	6400	5440	1631	1424	1929	1346	2733	2700	9200	1055600	1600	2107	5760	62	1120	1852		1105993		
OCTOBER	Cost	276.67	118.5	394.32	719.72	929.08	144.24	165.55	173.68	137.12	209.62	410.14	1176.42	66002.28	164.78	290.92	5044.04	74.52	172.26	264.78	76868.64			
	kwh	2760	1544	6375	7120	9600	1948	2398	2482	1304	2690	6329	13520	856800	1600	4673	59280	520	1680	2670		985293		
NOVEMBER	Cost	492.09	139.73	594.84	789.47	1437.17	166.8	176.72	205.88	158.95	222.22	479.89	1568.42	69730.78	179.89	426	5446.86	~	361.67	338.84	82916.22			
	kwh	5080	1924	9994	7840	16320	2351	2594	3059	1536	2911	7579	18880	911000	1760	7110	67440	~	3640	3460		1074478		
DECEMBER	Cost	624.75	132.45	749.29	696.04	1824.21	147.97	160.66	190.31	141.56	262.29	43.33	1784.66	65011.7	224.77	542.03	4846.93	~	486.29	298.17	78167.41			
	kwh	6920	1792	12792	6480	22240	2010	2303	2777	1350	3637	719	22000	838600	2240	9212	6000	~	4960	3025		949057		
	1999																						469367.43	6076520
JANUARY	Cost	760.16	145.31	869.53	691.29	1907.73	152.15	156.63	207.08	131.92	236.73	931.26	2038.02	65790.44	194.85	558.59	4605.97	~	552.24	284.14	80214.04			
	kwh	8680	2025	15145	6400	23200	2149	2230	3144	1247	3174	15756	25280	844800	1920	9512	55200	~	5480	2875		1028217		
FEBRUARY	Cost	708.25	84.4	940.74	676.4	1930.29	158.72	147.41	210.78	140.9	201.52	540.06	1887.78	66054.28	194.85	544.02	4184.79	~	531.59	269.3	79406.08			
	kwh	7960	941	16435	6560	23680	2268	2063	3211	1343	2536	8669	23360	855000	1920	9248	48720	~	5360	3005		1022279		
MARCH	Cost	580.89	68.32	869.64	691.47	1700.37	170.04	146.47	231.64	149.97	185.95	517.81	1693.54	66132.36	179.89	482.8	4817.29	~	448.61	278.63	79345.69			
	kwh	6360	722	15147	7280	20320	2473	2046	3589	1440	2254	8266	20640	859400	1760	8139	58800	~	4480	2816		1025932		
APRIL	Cost	404.29	92.65	671.09	749.47	1565.81	168.66	132.06	235.45	142.12	169.43	427	1630.9	73276.28	118.01	393.88	759.25	~	322.01	247.21	81505.57			
	kwh	4160	1071	11550	7440	18240	2448	1785	3658	1356	2462	7128	19920	982000	1120	6528	4320	~	3280	2480		1080946		
MAY	Cost	172.16	76.47	339.43	350.22	684.59	55.59	109.83	174.03	128.75	201.43	209.23	646.34	51279.17	~	214.93	217.29	~	175.9	194.53	55229.89			
	kwh	1640	833	185	3280	6400	501	1319	2482	1213	2341	2501	5680	638000	~	3223	2160	~	1680	1865		675303		
JUNE	Cost	101.35	76.18	254.16	464.46	344.45	62.45	105.73	166.73	148.38	142.67	258.37	608.74	50150.4	~	146.08	329.49	~	123.79	186.44	53669.87			
	kwh	920	829	3997	3920	3520	642	1308	2413	1423	1470	3566	6480	653600	~	2039	3360	~	1160	1830		692477		
JULY	Cost	67.44	90.55	178.63	577.18	289.43	95.75	101	127.38	114.63	142.15	212.81	458.49	46864.81	~	103.87	1295.94	~	93.62	169.19	50982.87			
	kwh	520	1033	2454	5200	2880	1064	1159	1637	1062	1267	2566	4080	601200	~	1211	15840	~	800	1594		645567		
AUGUST	Cost	63.95	100.87	107.99	612.97	299.57	101.43	99.99	108.93	120.14	134.45	154.49	470.74	53784.9	~	79.04	1162.83	~	101.35	170.63	57674.27			
	kwh	520	1220	1349	5760	3040	1230	1204	1366	1121	1321	1684	4480	702600	~	868	13920	~	920	1661		744264		
SEPTEMBER	Cost	93.62	118.59	169.69	684.7	514.55	121.81	109.88	152.39	136.97	193.21	273.59	778.58	62241.13	~	104.64	598.09	~	127.28	206.12	66624.84			
	kwh	800	1541	2292	6800	4800	1536	1320	2090	1301	2192	3667	8080	811800	~	1225	4560	~	1160	1989		857153		
OCTOBER	Cost	370.63	290.93	407.4	851	972.43	147.52	119.92	201.17	139.31	192.3	368.94	1076.26	65392.76	~	291.15	5274.87	~	217.29	247.02	76560.9			
	kwh	3800	4663	6773	9120	9760	2065	1565	3037	1326	2369	5569	12000	857400	~	4667	63120	~	2160	2478		991872		
NOVEMBER	Cost	481.83	384.93	601.1	845.82	1397.65	171.36	130.35	230.76	163.9	202.9	405.26	1463.62	69503.74	~	410.6	6077.89	~	333.23	309.57	83114.51			
	kwh	5000	6366	10282	8800	16160	2497	1754	3573	1589	2561	6227	17280	922800	~	6831	76.8	~	3400	3147		1018343.8		
DECEMBER	Cost	615.49	286.84	706.25	695.55	1725.49	121.57	133.33	159.05	151.19	227.07	389.64	1535.7	59779.78	~	477.56	4485.49	~	449.17	319.02	72258.19			
	kwh	6840	4589	12187	6240	20480	1595	1808	2274	1453	2999	5944	18320	757000	~	8044	52800	~	4640	3248		910461		
	2000																						836586.72	10692814.8
JANUARY	Cost	825.54	296.28	1078.74	936.19	2100.69	161.67	154.69	236.67	161.56	218.13	564.46	2030.66	72787.38	~	584.81	4421.36	~	563.33	436.36	87558.52			
	kwh	9720	4760	18935	9760	26080	2240	21.95	3680	1564	2837	8640	25600	962000	~	9987	51360	~	6000	4503		1147687.95		
FEBRUARY	Cost	830.03	296.28	1090.38	947.85	2106.51	0	159.18	241.16	161.56	229.81	576.1	2052.61	72616.17	~	589.3	4421.36	~	567.82	442.18	87328.3			
	kwh	9720	4760	18935	9760	26080	0	2195	3680	1564	2837	8640	25600	962000	~	9987	51.36	~	6000	4503		1096312.36		
MARCH	Cost	566.47	97.67	799.65	888.08	1620.53	335.96	124.55	206.97	141.56	196.49	463.06	1555.3	66889.6	~	443.72	4929.99	~	406.41	363.9	80029.91			
	kwh	6160	1162	13879	9520	19200	2340	1649	3142	1350	2445	6803	18720	877600	~	7431	60720	~	4080	3728		1039929		
APRIL	Cost	438.7	73.38	673.71	777.67	1423.79	155.26	123.95	192.98	136.51	200.99	429.44	1290.61	62494.73	~	420.25	929.65	~	337.72	347.84	70447.18			
	kwh	4480	786	11067	7440	16320	2052	1500	2717	1296	2238	5808	14800	948000	~	6724	9600	~	3400	3494		1041722		
MAY	Cost	300.32	~	378.08	547.26	987.63	76.83	118.7	164.73	135.57	203.33	269.35	890.19	54714.77	~	371.39	467.53	~	233	319.79	60178.47			
	kwh	3000	~	5834	5600	10240	748	1401	2210	1286	2270	2974	9040	717000	~	5842	3600	~	2280	3194		776519		
																							385542.38	5102170.31
TOTAL COST ($)																					1691496.53			
TOTAL KWH																						21871505.11		

~ The Heating Plant, as of May 1999, has been billed through the Physical Plant. The University Farm burnt down in October of 1998.
*These buildings have a dusk till dawn charge which is included in the cost sections.

Appendix D-Light Oil Consumption May 1998-April 2000

May 98-April 99	Litres	Cost	
May	3080	731.07	
June	2459	557.09	
July	1603	350.25	
August	1251	260.39	
Sept	2248	504.45	at approximately 24 cents/litre
Oct	5381	1325.93	
Nov	70826	2657.58	
Dec	12012	2663.38	
Jan	19108	4043.23	
Feb	9896	1976.37	
March	14032	2887.08	
April	9585	2303.75	
Total	151481	20260.57	
May 99-April00			
May	3267	822.79	
June	814	190.96	
July	3303	839.84	
August	0	0	
Sept	144	42.89	at between 25 and 36 cents/litre
Oct	4142	1350.89	
Nov	11943	3983.93	
Dec	9122	3096.37	
Jan	17987	6885.17	
Feb	13697	6279.01	
March	11290	4661.77	
April	8511	3146.32	
Total	84220	31299.94	

Appendix E-Bunker A Oil Consumption May 1997-April 2000

May 97-April98	Litres	Cost*
May	220644	39709.85
June	35372	6646.75
July	109588	20420.63
August	80753	15360.02
Sept	76402	15059.6
Oct	241855	48404.23
Nov	240574	51272.51
Dec	360333	79905.89
Jan	328587	66296.64
Feb	288474	52794.84
March	324578	54003.41
April	205890	32792.59
Total	2513050	482667

May 98-April99		
May	82348	14037.2
June	41185	7279.65
July	76526	13404.68
August	81840	14042.29
Sept	82043	12647.16
Oct	122862	19738.4
Nov	239372	40103.59
Dec	286630	48355.9
Jan	386851	56565.08
Feb	217736	34229.19
March	293910	42838.04
April	219852	34672.57
Total	2131155	337913.8

Appendix F-Ventilation and Heating

Building	Heating	Ventilation
Flemington	Hot water baseboards	Ventilation system with steam coil in auditorium for heat
CLT	Hot water baseboards and radiant panels	None
Convocation Hall	Hot water baseboards	Ventilation system with seven reheat steam coils
Crabtree	Hot water baseboards	Three ventilation systems with numerous AC units
Fawcett	Electric baseboards and electric forced air units	None
Gairdner Fine Arts	Hot water baseboards	None
Harper	Hot water baseboards	Eight roof top exhaust fans
Hunton House	Hot water baseboards	Two roof top exhaust fans
Jennings		
MacGregor	Oil fired hot air (forced air)	None
Pavillon Bousquet	Oil fired hot water baseboards	None
Owens Art Gallery	Electric heat	Two ventilation systems, both with hot water coils, humidifiers and cooling coils
Palmer	Hot water baseboards	None
Persident's Cottage	Hot water baseboards	None
Allison Gardens	Hot water baseboards	heat source low pressure system
Sprague House	Electric baseboards	None
Thornton	Hot water baseboards	Two roof top exhaust fans
University Center	Hot water baseboards	Two ventilation systems with steam coils
Windsor Hall	Hot water baseboards	Roof top exhaust fans
Library	Hot water baseboards	Ventilation system with hot water heating coils
PEG		
Trueman/Tweedie	Hot water baseboards	None
McConnell	Heat from steam coils in ventilation	Ventilation system with steam coil
Athletic Center	Hot water baseboards	Two ventilation systems with steam coils and one dehumidification unit
Avard-Dixon	Hot water baseboards	Ventilation system with steam coil
Barclay	Hot water baseboards	Three heating and ventilation units for hallways and one system for machine shop
Baxter House	Oil fired hot air (forced air)	None
Cranewood	Oil fired hot air (forced air)	None
Bennet House	Hot water baseboards	Two roof top exhaust fans
Bermuda House	Electric baseboards	Washroom exhaust fan system
Bigelow House	Hot water baseboards	Two roof top exhaust fans
Black House	Oil fired hot water baseboards	None
Carriage	Electric baseboards	None
Anchorage	Oil fired hot water baseboards	None
Centennial Hall	Hot water baseboards	None
Chapel	Hot water baseboards	One ventilation system with hot water coil
Colville House	Oil fired hot air (forced air)	None
Conservatory	Hot water baseboards	Ventilation system with hot water coils
Cuthbertson	Electric baseboards	None
Edwards	Hot water baseboards	Two roof top exhaust fans
Facilities Management	Hot water baseboards	Two air exchangers
Hart Hall	Hot water baseboards	One ventilation system with Glycol heat reclaim and electric coils

Appendix G- Alterations Affecting Energy Consumption 1998-2000

Date	Building	Alteration
August 98	Palmer	upgrade branch circuits
August 98	Baxter	electrical upgrade
August 98	Bigelow	2nd floor washroom renovation
August 98	University Centre	pub washroom renovation
August 98	Cranewood	radiant heating repair
Sept 98	Gairdner	upgrade ventilation
Sept 98	Centennial	emergency power hook-up
Oct 98	Convocation	emergency lighting
Nov 98	Convocation	exterior lighting
July 99	Bigelow	1st floor washroom upgrade
August 99	Harper/Windsor	electrical connection
Sept 99	Barclay	renovate rooms 11-13
Sept 99	Heating Plant	interior renovation
Sept 99	Harper	balance ventilation system
Oct 99	Campus	re-establish energy monitoring meter system
Dec 99	Flemington	lab renovation
Feb 00	Jennings	extensive renovation
April 00	Centennial	install heat exchanger in SEM lab

Appendix H-Emissions Questionnaire

(created by the Canadian Mortgage and Housing Corporation and was published in the Calgary Herald Saturday, May 20, 2000**)**

"Greenhouse Gas Emission Questionnaire"

Too many people think there is little they can do to help reduce greenhouse gas emissions. In fact, the car you drive and the way you operate your household are major emitters. When combined with the emissions incurred in manufacturing the various products you buy-especially the "embodied energy" in houses and cars-your personal choices account for about one-third of the total greenhouse gases produced in Canada each year.

How does your household fare in terms of its greenhouse gas emissions? To help you answer that question, take this questionnaire to help you get a rough estimate of your household emissions. All you'll need is a calculator, and some basic information about your energy use, food habits and waste generation. When you are finished, you can check your household's emissions (expressed here in terms of kilograms of emissions) against those of a typical Canadian household.

HOME

Operating Energy

There are two ways to calculate greenhouse gases emitted from your dwelling due to energy consumption. Those who have access to their utility bills should use method #1. Those without access to utility bills should use method #2.

Method #1

What is your average monthly electrical consumption?

(KWh/month) x 6 = kg/yr. _____

What is your average monthly natural gas consumption?

(cubic metres/month) x 23 = kg/yr. _____

What is your average monthly oil consumption?

(litres/month) x 38 = kg/yr. _____

If the cost of heating your dwelling is not included in the above bills (eg. If your landlord pays for your heat), you need to add emissions from this source. The amount will depend on the square footage of your dwelling (including basement if you have one) and the type of fuel used. Choose the right fuel type factor from these values-oil:3.4, electric:4.2, gas:2.0

(Sq ft) x)fuel type factor) = kg/yr. _____

Method #2

If you do not pay utility bills or you do not have access to them, you can estimate your emissions by knowing the size of your home and the type of energy used to heat it. For the size of your dwelling, enter the area (in square feet). If you live in an apartment, include only the area of your unit. If you live in a house, include the basement. For the fuel type, enter the following factor-oil: 6.0, electric: 6.5, gas: 4.0.

Your emissions will also depend on whether you (or your landlord) have taken special steps to improve the energy efficiency of your dwelling (eg. caulking, high efficiency lighting, electronic thermostats, etc.). If you have, enter 0.85 for the efficiency factor below. If not, enter 1.

(sq ft) x (fuel type factor) x (efficiency factor) = kg/yr. _____

Embodied Energy

Energy was used to create the materials that went into constructing your dwelling. The larger your dwelling, the greater the emissions involved. Enter the square footage of your dwelling in the formula below. If you live in an apartment, include only the area of your unit. If you live in a house, include the basement.

Homeowners: The construction of a newly-built home triggers greenhouse gas emissions. If you have kept the same home or bought only older homes for at least 10 years, discount your emissions by entering 0.75 in the equation. Otherwise enter a 1.

(sq ft) x (discount factor) x (o.57 = kg/yr. _____

Second Home

If you own or rent a second home or cottage, go through the above calculations (for both operating and embodied energy) for that home and enter the amounts here:

(operating energy) + (embodied energy) = kg/yr. _____

YOUR TOTAL HOME-RELATED EMISSIONS= KG/YR _____

PERSONAL TRANSPORTATION

Does anyone in your household use a vehicle? If no, enter 0 at the end of this section and go to the next section on Mass Transportation.

Operating Energy

If someone in your household does use a vehicle, you can estimate the yearly operating emissions if you know the fuel efficiency of the vehicle and the approximate distance drive per year. In the equation below, fuel efficiency is expressed in terms of the number of litres your vehicle uses for each 100 km travelling (eg. if it is 10 litres per 100 km, enter 10).

The kilometres driven should be the aggregate for everyone in your household.

If you don't know the exact fuel efficiency of the vehicle, you can estimate it by choosing the most appropriate factor from this list:

- full-size pick-up,. Full-size SUV: 18
- full-sized car, mini-pick-up, small SUV, or minivan: 16
- mid-sized car: 11
- small car: 9

(Fuel efficiency) x (km/yr) x .025 = kg/yr. _____

Embodied Energy

Larger vehicles consume more energy during their manufacture and therefore have higher emissions from embodied energy. To calculate the embodied energy of the vehicle you use, choose the appropriate factor from the following list of vehicle types and enter it in the equation below.

- full-size pick-up, full-size SUV: 725
- full-sized car, mini-pick-up, small SUV or mini-van: 678
- mid-sized car: 608
- small car: 524

Vehicle Owners

Buying a newly-built vehicle triggers more manufacturing and more emissions. If you have kept the same car or bought only used cars for at least five years, discount your energy by entering 0.75 in the equation. Otherwise enter a 1.

_____ (vehicle type factor) x _____ (discount factor) = ____kg/yr.

Second Vehicle

If your household uses more than one vehicle, go through the above calculations (for both operating and embodied energy) for each extra vehicle and enter the amounts:

(operating energy) = (embodied energy) = kg/yr. _____

YOUR HOUSEHOLD'S PERSONAL TRANSPORT EMISSIONS = KG/YR. _____

MASS TRANSPORTATION

In an average week, how far do people in your household travel on local transit?

(km/wk.) x 2.3 = kg/yr _____

In an average week, how far do people in your household travel on the inter-city train or bus?

(km/wk) x 0.15 = kg/yr. _____

In an average year, how far do people in your household travel by plane (including business travel)?

(km/yr) x 0.25 = kg/yr. _____

YOUR HOUSEHOLD'S MASS TRANSPORTATION EMISSIONS = KG/YR. _____

WASTE

The garbage you put out contains embodied energy and will take energy to transport and dispose of. On average, how many green garbage bags or garbage cans does your household put out per week?

(bags or cans/wk) x 300 = kg/yr. _____

YOUR HOUSEHOLD'S WASTE-RELATED EMISSIONS = KG/YR. ___ _____

FOOD

The amount of emissions related to your household food consumption will depend on your eating habits. Eating vegetables, fruits, and grains causes lower emissions than getting the same amount of food energy from meat. Organic food avoids energy-intesive chemical fertilizers and pesticides. Buying food grown in your region involves less transportation energy than food from abroad. So if members of your household make an effort to eat a

non-meat diet and buy organic or locally-produced food, enter a discount factor of 0.5 below. If not, enter 1.

(# people) x 860 x (discount factor) = kg/yr. _____

YOUR HOUSEHOLD'S FOOD-RELATED EMISSIONS = KG/YR. _____

_____

TOTAL EMISSIONS

Each household has its own emissions "profile" depending on personal choices and circumstances. For instance, your household may have heavy emissions in personal transport if you drive a lot, or in mass transport if you fly frequently. In order to see your household's profile and total emissions bring forward the sums you arrived at in the questionnaire to fill out the following table. Add them up to get your household's grand total.

Home	_____ kg/yr.
Personal Transportation	_____ kg/yr.
Mass Transportation	_____ kg/yr.
Waste	_____kg/yr.
Food	_____kg/yr.

GRAND TOTAL = KG/YR. _____

A typical Canadian household of two adults and two children in a 2500 sq. ft. house with one car would score about 27, 650 kg/yr on this questionnaire. This should give you some idea as to whether your household's emissions are high or low compared to the average.
This is a working version of the questionnaire. If you have any comments or suggestions, please email Ray Tomalty at corps@web.net. A final version of this questionnaire will be available in the fall of 2000 from CMHC's Canadian Housing Information Centre. Call (613) 748-2367.

Appendix I-Science Stores Hazardous Waste Disposal 1999

Description	Quantity	Unit	Total
MAUS-110-D Waste halogenated solvents	1	170.55L	170.55L
MAUS-130-P Waste ink solids	1	20 L	20 L
MAUS-181-M Waste solid labpack	1	0.25L	0.25L
MAUS-150-N Waste contaminated glass	2	170.55L	341.1L
MAUS-150-R Waste hazardous solids contaminated PPt	3	20L	60L
MAUS-150-P Waste hazardous solids magnesium sulfate filters	2	20L	40L
Disposal Services for potenial explosive chemicals	1		
MAUS-190-Q Aerosol labpack	4	labpack	
MAUS-189-C Waste cynides	1	0.25L	0.25L
MAUS-108-O Waste ethidium promide	4	20L	80L
MAUS-150-I Waste selenium	1	0.25L	0.25L
MAUS-177-P Waste sodium perchlorate	6	20L	120L
MAUS-180-J Labpack	1	labpack	
MAUS-108-R Waste glycol	1	20L	20L
MAUS-101-L Waste oil	4	20L	80L
MAUS-110-D Waste chlorinated solvent	1	170.55L	170.55L
MAUS-150-N Waste contaminated glass	1	170.55L	170.55L
MAUS-102-H Waste nonhalogenated solvents	1	170.55L	170.55L
MAUS-150-N Waste contaminated glass	1	170.55L	170.55L
MAUS-181-M Labpack inorganic	2	labpack	
Total			3229.2L

Appendix J- Atomic Energy Control Board License Renewal

Atomic Energy Control Board | Commission de contrôle de l'énergie atomique

Ottawa, Canada
K1P 5S9

DIRECTORATE OF FUEL CYCLE
AND MATERIALS REGULATION

Registered

Your file Votre référence

Our file Notre référence
15-1-4021

November 1, 1998

Jack Stewart
Mount Allison University
TransCanada Hwy & Hwy 106
Sackville, NB E0A 3C0

SUBJECT: **Renewal, Extension or Revocation of Radioisotope Licence No. 03-04021-99-REV2**
Licensed Activity: 837-laboratory studies: 3 to 9 laboratories
Licence Expiry Date: January 31, 1999
Application Submission Date: January 1, 1999

This letter serves to notify you that the above noted licence issued to Mount Allison University will expire on January 31, 1999, and to describe what licensing actions are required at this time.

Atomic Energy Control Board (AECB) Proposal to Extend the Valid Period of Your Radioisotope Licence

It is anticipated that early in 1999 the Atomic Energy Control Act will be replaced by the Nuclear Safety and Control Act.

As a transitional measure to provide time to prepare for the implementation of this new legislation, the AECB proposes to extend for two years the valid period of expiring radioisotope licences that meet certain criteria. This extension replaces the usual licence renewal thereby deferring the usual pre-renewal assessment.

We will only extend those licences whose records lead us to believe that health and safety are not being compromised by deferring the usual pre-renewal assessment. Compliance inspections will not be affected by these proposed measures and will be performed as usual.

It has been determined that your licence meets the extension criteria and therefore in accordance with section 27 of the Atomic Energy Control Regulations, you are hereby notified that the AECB proposes to extend the valid period of your existing licence, 03-04021-99-REV2, by amending the expiry date to January 31, 2001. If you agree to this extension proposal please complete the attached agreement form and return it to the AECB no later than January 1, 1999.

This proposed measure applies only to the expiry date of your licence. It will continue to be your responsibility to keep us informed of any changes you wish to make to your operations which might affect your licence.

If you do not agree with this proposed extension, please complete the attached renewal application or disposition form in accordance with the following instructions.

.../2

Appendix K-Inventory of Radioactive Materials May 2000

Isotope	Description	Activity	Quantity	Total activity
Cs137	sealed orange disk	5 microCi	1	185 kBq
Co60	sealed orange disk	1 microCi	4	148 kBq
Sr90	sealed green disk	0.1 microCi	3	11.1 kBq
Tl204	sealed green disk	1 microCi	2	74 kBq
Tl204	sealed yellow disk	10 microCi	1	370 kBq
Tl204	sealed yellow 1/2 disk	unlabelled	2	unknown
Ra226	in wooden boxes	5 microCi	2	370 kBq
Po210	cloud chamber	<0.1 microCi	2	<7.4 kBq
Sr90	cloud chamber	<0.1 microCi	2	<7.4 kBq
unknown	labelled 1 mrem/h	unknown	1	unknown
unknown	6cm diam. plastic disk	unknown	1	unknown
unknown	14 items, wrapped in black plastic	unknown	14	unknown

Appendix L-Hazardous Materials used in Printmaking Studio 1999-2000

Description	Purchased (99/00)	Used (99/00)
Nitric Acid	15.6 litres	12 litres
Acetic Acid	2.4 litres	0
Hydrochloric Acid*	0	0
Phosphoric Acid*	0	0
Tannic Acid Plate Etch	0	2.4 litres
Acetone	4 litres	4 litres
Methanol	8 litres	11 litres
Varsol	342 litres	342 litres
Asphaltum*	0	0
Western Litho Neg Coating*	0	0
Western Litho PN Developer*	0	0
EP 26 Developer	40 grams	40 grams
Polychrome #229 Image Remover	224 grams	224 grams
Tech 401 C	56 grams	56 grams
ND 232 Negplate Developer	24 litres	17 litres
CID Developer (Kodalith)	38 litres	19 litres
UDC2 Photo Sensitive Emulsion	2 litres	2 litres
Red Iron Oxide	0	100 grams
Inks	49 litres	51 litres
Deep Etch Lacquer C*	0	0

*These products are rarely utilised by the printmaking staff and students. They are kept on hand in case the need for them arises. If they are used, the quantity and use are minimal.

Appendix M- Indoor Pesticide Use (November 1997-November 1999)

Chemical	Active Ingredient	Use	Amount Used
Ficam W	Bendiocarb	spiders, sliverfish, ants bees, earwigs, wasps hornets, fleas	100 grams
PT 270 Dursban	Chlorpyrifos	spiders, sliverfish, ants bees, earwigs, wasps hornets, fleas, grain weevels	3632 grams
Pyrethrin	Pyrethrin	bees, wasps, hornets	2 litres

Appendix N-Hazardous Materials used in Custodial (

Company	Product	Quantity used	Use	Toxicology Data
CSS International	Ambio Care	0	odour control	skin and eye irritant
CSS International	Vision	243.84 litres	rug detergent	skin and eye irritant, slightly hazardous if ingested
CSS International	Super Selection	1947.73 litres	floor finish	skin and eye irritant
CSS International	Servosept	0	disinfectant	carcinogenic (classified SUSPECTED); skin, eye and digestive tract irritant
CSS International	Servopro	87.4 litres	floor detergent	very hazardous for eye contact, skin irritant
CSS International	Rodian Strip	283.65 litres	floor finish striper	skin, eye and mouth irritant
CSS International	Flash Up	72.39 litres	floor finish restorer	slightly hazardous for the skin and eyes
CSS International	Rodian Klean	30.4 litres	floor detergent	skin, eye and mouth irritant
CSS International	Neutrac Auto	57 litres	neutralizer	skin, eye and mouth irritant
CSS International	Linocel NG	624.03 litres	floor sealer	skin and eye irritant
Chandler	Complex Orange	216 litres	degreaser	slight to moderate toxicity if swallowed, skin and eye irritant
Chandler	Easy Off	3.325 litres	oven cleaner	will cause burns to skin
G.H. Wood	Heavy Duty Blue	660 kilograms	laundry detergent	skin, eye and mouth irritant
G.H. Wood	Scrub E-Z-E	588 litres	aqueous acid cleaner	sever skin and eye irritant, harmful if ingested
G.H. Wood	Tendereze	616 litres	hand soap	eye and digestive tract irritant
Single Source	Klinger	574.488 litres	bowl & urinal cleaner	sever skin irritant, may cause sever eye burns, ingestion may cause death
Canadian Salt Co.	Calsium Chloride	440 kilograms	wide application	not harmful unless consume in very large amounts
Save Easy	Javex	737.2 litres	bleach	extremely corrosive to eyes, moderate skin irritant
	Comet	0.8 kilograms	cleanser	skin and eye irritant

* Calsium Chloride is purchased throught the grounds department and therefore does not show up in the custodial departments purchasing or inventory information.

Appendix O- Cleaning Materials Used in Food Services 1999-2000

Product	Quantity
Solid supra (dishwasher soap)	294.9 kg
Solid fun (pot washing soap)	145.2 kg
Stainless Soak (cutlery soap)	154.3 kg
Dynamic green Dininghall	?*
Dynamic yellow Kitchen floor	?
DermaKleen hand soap	352L
Ster-back Sanitizer	?
Lime-away	128L
Glass cleaner (windows)	?
MicroMax D (dish rinse)	?
Rinse Dry	?

*In many cases the director of food services was unable to tell the auditors how much of a product had been used. This was a result of the move from McConnell to Jennings meal hall.

Appendix P- Products used in the Shop

Product	M.S.D.S Date	Use	Toxicology Data
Adhesive Anchor	Dec 1994	Adhesive	Silica (60-80%) and Styrene (7-13%) possible human carcinogens; some evidence of mutagenicity
Ambio Care	Dec 1999	Odor Control	
Bondfast	Exempt *	Odor Control	
Cement Paint #200	Exempt	Liquid	
CF 100/120 R1	May 1994	Solvent	
Clean Lube II	Feb 1993	Lubricant	
Concrete Bonding Agent	Exempt	Adhesive	chronic inhalation may cause chemical pneumonitis
Contact Cement	Exempt	Adhesive	ingestion may cause bronchopneumonia or pulmonary edema
Contact Cement Cleaner	Exempt	Cleaner	toxic if swallowed
Contact Cement Green	Exempt	Adhesive	
DX Cartridges (safety boosters)	May 1993	Power Loads	carcinogen in animals
Fire Extinguishers	Jan 1999	Fire	
Foam Insulation	Exempt	Adhesive Foam	chronic exposure may result in fibrosing alveolitis, liver changes
Foundation Coation	Sept 1991		
Hilti Spray	Jan 1995	Lubricant	
Hit C 20	Jan 1995	Lubricant	chronic exposure may result in lung, liver kidney damage; Styrene (20-40%) carginogenic; evidence of mutagenicity
Hit C-100	Jan 1995	Adhesive	chronic exposure may result in lung, liver kidney damage; Styrene (10-30%) and Quartz (50-60%) carcinogens; evidence of mutagenicity
Joint Compound	Exempt	Powder	
Joint Treatment Products	Exempt	Filler	
Keraproxy Part A	July 1994	Epoxy	
Keraproxy Part B	July 1994	Epoxy	suspected mutagenicity
Klinger	May 1997	Bowl & Urinal Cleaning	
Methyl Hydrate	Exempt	Carpenter Shop	
Moulding Plaster	Exempt	Wall and Ceilings	
Patch & Bond II	Exempt	Cold Patch Mix	
Patching Compound	Exempt	Resurfo	
Quick Plug	Exempt	Patching	
Rid Rust	May 1996	Aersol Lubricant	
Servopro	Nov 1999	Floor Degreaser	
Servosept	Nov 1999	Disinfectant	suspected carcinogen (NtaNa3)
Tile Grout Powder	Exempt	Carpenter Shop	
Wall Paper Paste	Exempt	Adhesive	
Waterproof Cement	Exempt		
WD 40	Exempt	Lubricant	
Windex	Exempt	Glass Cleaner	

* "Exempt" refers to those products which pose minimal risk and can be purchased separately

Appendix Q- Chemicals used in Pool (98-00)

Chemical	Quantity (litres)	Quantity (kg)	Use
Atlantic 12	4120	~	liquid chlorine for disinfecting the pool water
Ph down	~	10	used to lower the PH of the pool water
Muriatic Acid	224	~	liquid used for lowering total alkalinity of the pool water
R001	120 ml	~	reagent for testing the chlorine and PH in the pool water
R002	120 ml	~	reagent for testing the chlorine and PH in the pool water
R003	120 ml	~	reagent for testing the chlorine and PH in the pool water
R004	180 ml	~	reagent for testing the chlorine and PH in the pool water
Granular Chlorine	~	360	granular chlorine now replaced with Atlantic 12
Sodium Bicarbonate	~	175	used to raise total alkalinity of the pool water
Calcium Chloride	~	140	used to raise calcium hardness of the pool water
Soda Ash	~	120	used to raise PH of the pool water
Super Sequa	~	16	used to prevent staining when the pool is refilled
Oxybrite	~	50	non chlorine oxidizer used for shock treatment, restores sparkle
Grime Away	4	~	acid based cleaner, removes stain, scale on tile
Calcium Hypochlorite	~	30	granular chlorine now replaced with Atlantic 12

Appendix R- Recycling Statistics Oct 1998-April 2000

Location		Jan-Apr 00	Jan-Dec 99	Oct-Dec 98
Harper	Non-Alc.	2818	6526	1797
	Alc.	470	1038	1166
Palmer	Non-Alc.	2471	4547	2072
	Alc.	104	65	101
Windsor	Non-Alc.	2816	7156	3139
	Alc.	497	1367	581
Bennett	Non-Alc.	957	2603	907
	Alc.	1326	3827	1238
Bigelow	Non-Alc.	818	2145	704
	Alc.	868	3377	1425
Trueman	Non-Alc.	1741	4459	1611
	Alc.	200	1823	1055
Hunton	Non-Alc.	1204	1645	1019
	Alc.	817	1447	1475
Thorton	Non-Alc.	1470	2375	1050
	Alc.	1214	6497	2184
Edwards	Non-Alc.	1973	4118	1954
	Alc.	659	2681	1174
Bermuda	Non-Alc.	1126	2196	539
	Alc.	638	1381	407
Monastery	Non-Alc.	647	1083	440
	Alc.	325	309	49
McGregor	Non-Alc.	197	238	252
	Alc.	18	194	80
Cuthbertson	Non-Alc.	117	290	61
	Alc.	137	223	4
Colville	Non-Alc.	143	430	186
	Alc.	74	74	164
Carriage	Non-Alc.	160	71	45
	Alc.	406	96	7
Student Center	Non-Alc.	1064	2221	575
	Alc.	29	96	17
Chemistry	Non-Alc.	194	148	0
	Alc.	0	2	0
Library	Non-Alc.	0	205	0
	Alc.	0	65	0
Athlc Center	Non-Alc.	878	1719	1056
	Alc.	15	58	1
PEG	Non-Alc.	0	183	61
	Alc.	0	61	0
Avard Dixon	Non-Alc.	0	165	69
	Alc.	0	35	0
Chem. Lib, Athl, PEG*	Non-Alc.		368	
	Alc.		0	

*these buildings' numbers are shared starting the week of March 15, 1999

Appendix S-Water consumption in cubic meters for 1999-2000

Building	Jan 1 to June 30, 1999	July 1 to Dec 31, 1999	Jan1 to June 30, 2000
Allison Gardens	2 638	4 578	1832
Athletic Centre	5 272	5 112	8493
Avard-Dixon	207	362	591
Barclay Bldg	7 838	8 490	11338
Baxter	14	14	17
Bennett / Bigelow	4 543	3 925	4016
Bennett Carriage Hse	388	380	410
Bermuda	1 091	1 245	1117
Flemington	3 884	2 490	2160
Black House	84	93	90
Canadian Studies	241	173	123
Centennial Hall	287	293	325
Central Stores	84	87	101
CLT	59	50	63
Colville	305	243	241
Conservatory	967	745	917
Convocation Hall	230	110	384
Crabtree	3 645	9 348	2554
Cranewood	184	175	220
Cuthbertson	409	255	288
Edwards / Thornton	4 530	4 699	4726
Facilities Mgmt Bldg		140	134
Fine Arts	499	445	461
Harper / Jennings	8 267	7 069	11826
Hart Hall	2,534	2,571	2374
Heating Plant	32	1,940	3085
Hess Hse	2	241	
Hillcrest	12	16	21
Hunton	1 998	2 580	1935
Library	1 062	617	782
McGregor	423	318	407
Monastery	483	565	679
Owens Art Gallery	63	62	546
Palmer	2 962	3 255	2476
Physics & Eng Bldg	540	806	620
Presidents Cottage	254	198	207
Sprague	11	7	24
Student Centre	2 627	2 321	2105
Trueman	17 624	22 739	13418
Windsor	5 309	7 570	6468
York St Children's Ctr	250	203	235
Totals	81852	96530	87809

Appendix T- Mount Allison University Students' Administrative Council Environmental Policy

Mission Statement

Increasingly the world is significantly impacted by global issues, whether they be economic, social or environmental. In Canada we consume a disproportionate amount of the global resources with serious ecological and social consequences. Consequently, the Mount Allison University Students' Administrative Council will "think globally, act locally". While its foremost goal will be to serve the student body in an effective manner, the SAC will strive to reduce the ecological and social impact of all aspects of its work, and inspire others to do the same.

1. The SAC will minimize its ecological footprint wherever possible by:

1.1 minimizing its energy consumption;

1.2 promoting, supporting, and initiating renewable energy projects on campus;

1.3 reducing its consumption of paper products while seeking out paper products with high post-consumer recycled fibre content;

1.4 striving to create sources of carbon absorption to equal to the amount of carbon produced through its consumption of energy and paper (i.e., planting trees);

1.5 helping the University to comply with its own environmental policy by identifying areas of noncompliance as well as engaging in mutually beneficial campaigns, projects, and promotions;

1.6 maximizing the use and support of public transport; and

1.7 considering environmental issues in all of its purchasing decisions, including purchasing certified organic products.

2. The SAC will address the social impact of its activities wherever possible by:

2.1 avoiding business relationships with companies with poor social or environmental reputations;

2.2 conducting financial transactions in an ethical manner, including choosing ethically-screened investment alternatives;

2.3 actively lobbying and working with the University to improve its social responsibility;

2.4 publicly supporting the students' right to education globally; and

2.5 considering social issues in all of its purchasing decisions, including purchasing fair trade and organic products.

3. The SAC will educate the student body on social and environmental issues wherever possible through:

3.1 Green Orientation;

3.2 messages in the media and other publications;

3.3 addressing justifiable environmental and social concerns that are either brought forward by the student body or are relevant to the operation of the SAC; and

3.4 ensuring that SAC activities set a positive example for the

University and the student body.

4. The SAC will monitor its social and environmental impact by conducting an audit a minimum of every two years. This will include:

4.1 an environmental audit

4.2 a comparison of the SAC's environmental and social impact to ten key indicators;

4.3 a social audit of business dealings; and

4.4 a financial audit.

5. A standing committee of the SAC, composed of both members of the SAC and students at large, will be responsible for:

5.1 implementing and ensuring compliance with the policy;

5.2 coordinating the audits of the SAC;

5.3 recommending changes to the policy when needed; and

5.4 acting as a liason body between the University and its Environmental Issues committee.

Appendix U-The Valdez Principles

(copied directly from Mount Allison University Environmental Audit-1998)

In 1989 the coaliton for Environmentally Responsible Economies developed a set of ten principles for corporate environmental responsibility called the 'Valdez Principles'.These principles are designed to commit businesses to protecting the environment through their actions and policies and are one way of evaluating university and corporate responsibility.

Introduction

By adopting these principles, we publicly affirm our belief that corporations have a responsibility for the environment, and must conduct all aspects of their business as responsible stewards of the environment by operating in a manner that protects the earth. We believe that corporations must not compromise the ability of future generations to sustain themselves.

We will update our practices continually in light of advances in technology and new understandings in health and environmental science. In collaboration with CERES, we will promote a dynamic process to ensure that the principles are interpreted in a way that accomodates changing technologies and environmental realities. We intend to make consistent, measurable progress in implementing these Principles and to apply them in all aspects of our operations throughout the world.

The Valdez Principles

1. Protection of the Biosphere

We will reduce and make continual progress toward eliminating the release of any substance that may cause environmental damage to the air, water, or the earth or its inhabitants. We will safeguard all habitants affected by our operations and will protect open spaces and wilderness, while preserving biodiversity.

2. Sustainable Use of Natural Resources

We will make sustainable use of renewable natural resources such as water, soils, and forests. We will conserve nonrenewable natural resources through efficient use and careful planning.

3. Reduction and Disposal of Waste

We will reduce and where possible eliminate waste through source reduction and recycling. All waste will be handled and disposed of through safe and responsible methods.

4. Wise Use of Energy

We will conserve energy and improve the energy efficiency of our internal operations and of the goods and services we sell. We will make every effort to use environmentally safe and sustainable energy sources.

5. Risk Reduction

We will strive to minimize the environmental, health and safety risks to our employees and the communities in which we operate through safe technologies, facilities, and operating procedures, and by being prepared for emergencies.

6. Marketing of Safe Products and Alternatives

We will reduce and where possible eliminate the use, manufacture,or sale of products and services that cause environmental damage or health or safety hazards. We will inform our customers of the environmental impacts of our products or services and try to correct unsafe use.

7. Environmental Restoration

We will promptly and responsibly correct conditions we have caused that endanger health, safety or the environment. To the extent feasible, we will redress injuries we have caused to persons or damage we have caused to the environment and will restore the environment.

8. Informing The Public

We will inform in a timely manner everyone who may be affected by conditions caused by our company that might endanger health, safety, or the environment. We will regularly seek advice and counsel through dialogue with persons in communities near our facilities. We will not take any action against employees for reporting dangerous incidents or conditions to management or appropriate authorities.

9. Management Commitment

We will implement these Principles and sustain a process that ensures that the Board of Directors and Chief Executive Officer are fully informed about pertinent environmental issues and are fully responsible for environmental policy. In selecting our Board of Directors, we will consider demonstrated environmental commitment as a factor.

10. Audits and Reports

We will conduct an annual self-evaluation of our progress in implementing these Principles. We will support the timely creation of generally accepted environmental audit procedures. We will annually complete the CERES Report, which will be made available to the public.

Appendix V-Curriculum

(source: Mount Allison University Course Calendar 2000-2001)

Environmental Studies Minor

To earn a minor in Environmental Studies 24 credits must be earned from the following courses:

3 from Geoscience 1001, 1011, 2031, 2101
3 from Geography 2101
9 from Economics 1000 (or 1001 and 1011) 3801
3 from Philosophy 3721 or Sociology/Anthropology 2501 or 2521
6 from Economics 3821, Geography 3101, 3201, 3531, 4101, Geoscience 2401, 3111, Philosophy 1651, 3511, Sociology/Anthropology 3541, 3611, 3621, 4521, 4541

Environmental Studies Major

To earn a major in Environmental Studies 72 credits must be earned from the following courses:

21 from Biology 1001, Chemistry 1001, Physics 1051, Economics 1000 (or 1001 and 1011), Geography 2101, Geoscience 1011.
24 from Economics 3801, Geography 2221, 3101, Geoscience 2031, Philosophy 1651 or 2701 or 3511, Philosophy 3721, Soc/Anthro 1001, 1011, 2501 or 2521
3 from Geography 2711 or Mathematics 2311
6 from Biology 1211, 1501, 2101, 3911, Chemistry 1501, Geoscience 1001, 2101, 2401, 3111
12 from Commerce 3611, Economics 2001, 2011, 3821, Geography 3201, 3531m 3711, 4521, History 1621, Philosophy 1651, 3511, Soc/Anthro, 2601, 3521, 3541, 3601, 3611, 3621, 4521, 4541
6 from Environmental Studies 4000

Environmental Science Major

To earn a major in Environmental Science 84 credits must be earned from the following courses

24 from Biology 1001, 1501, Chemistry 1001, 1021, Geography 2101, Geoscience 1011, Mathematics 1111, Physics 1051
3 from Mathematics 1121, 1131
3 from Physics 1551, 3511, 3521
3 Biology 2101
3 from Chemistry 2131 or 2141
3 from Biology 3701, Geography 2711, Mathematics 2311
9 from Economics 1000 (or 1001 and 1011), 3801

3 from Geoscience 2031
3 from Philosophy 1651, 2701 or 3511
3 from Philosophy 3721
3 from Environmental Science 4903

Natural Sciences Stream

3 from Biology 2301, 2401
9 from Biology 3331, 3341, 3351, 3361, 3371, 3551, 3711, 4001, 4701 or other group 1 or Group 3 Biology courses with permission of the Department
9 from Geography 3101, 3711, Geoscience 1001, 2101, 2401, 3111
3 from any Biology, Geoscience or Geography at the 3/4000 level

Physical Sciences Stream

12 from Computer Science 1711, Math 2111, 3531, Physics 2801
12 from Math 2121, Physics 3311, 3351, 3511, 3601, 3701, 4601, or with permission of the Head of the the appropriate Department, other third or fourth year Physics or Mathematics courses with significant environmental relevance.

Chemical Sciences Stream

6 from Chemistry 2221, 2321
12 from Chemistry 3011, 3311, 3411, 3421
6 from any other Chemistry at the 3/4000 level

Appendix W-The Talloires Declaration

(copied directly from Mount Allison University Environmental Audit-1998)

The Talloires Declaration

We, the presidents, rectors, and vice chancellors of universities from all regions of the world are deeply concerned about the unprecedented scale and speed of environmental pollution and degradation, and the depletion of natural resources.

Local, regional, and global air and water pollution; accumulation and distribution of toxic wastes; destruction and depletion of forests, soil, and water; depletion of the ozone layer and emission of "green house" gases threaten the survival of humans and thousands of other living species, the integrity of the earth and its biodiversity, the security of nations, and the heritage of future generations. These environmental changes are caused by inequitable and unsustainable production and consumption patterns that aggravate poverty in many regions of the world.

We believe that urgent actions are needed to address these fundamental problems and reverse the trends. Stabilization of human population, adoption of environmentally sound industrial and agricultural technologies, reforestation, and ecological restoration are crucial elements in creating an equitable and sustainable future for all humankind in harmony with nature.

Universities have a major role in the education, research, policy formation, and information exchange necessary to make these goals possible. Thus, university leaders must initiate and support mobilization of internal and external resources so that their institutions respond to this urgent challenge.

We, therefore, agree to take the following actions:

1.Use every opportunity to raise public, government, industry, foundation, and university awareness by openly addressing the urgent need to move toward an environmentally sustainable future.

2.Encourage all universities to engage in education, research, policy formation, and information exchange on population, environment, and development to move toward global sustainability.

3.Establish programs to produce expertise in environmental management, sustainable economic development, population, and related fields to ensure that all university graduates are environmentally literate, and have the awareness and understanding to be ecologically responsible citizens.

4.Create programs to develop the capability of university faculty to teach environmental literacy to all undergraduate, graduate, and professional students.

5.Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations.

6.Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information

exchange in environmentally sustainable development. Expand work with community and non-governmental organizations to assist in finding solutions to environmental problems.

7.Convene university faculty and administrators with environmental practitioners to develop curricula, research initiatives, operations systems, and outreach activities to support an environmentally sustainable future.

8.Establish partnerships with primary and secondary schools to help develop the capacity for interdisciplinary teaching about population, environment, and sustainable development.

9.Work with national and international organizations to promote a worldwide university effort toward a sustainable future.

10.Establish a Secretariat and a steering committee to continue this momentum, and to inform and support each other's efforts in carrying out this declaration.

Charter Signatories (Titles and Affiliations in 1990):

Jean Mayer, President and Conference Convener, Tufts University, Massachusetts, USA
Pablo Arce, Vice Chancellor, Universidad Autonoma de Centro America, Costa Rica
L. Ayo Banjo, Vice Chancellor, University of Ibadan, Nigeria
Boonrod Binson, Chancellor, Chulalongkorn University, Thailand
Robert W. Charlton, Vice Chancellor, University of Witwatersrand, South Africa
Constantine W. Curris, President, University of Northern Iowa, USA
Michele Gendreau-Massaloux, Rector, l'Academie de Paris, France
Adamu Nayaya Mohammed, Vice Chancellor, Ahmadu Bello University, Nigeria
Augusto Frederico Muller, President, Fundacao Universidad Federal de Mato Grosso, Brazil
Mario Ojeda Gomez, President, El Colegio de Mexico, Mexico
Calvin H. Plimpton, President Emeritus, American University of Beirut, Lebanon
Wesley Posvar, President, University of Pittsburg, Pennsylvania, USA
T. Navaneeth Rao, Vice Chancellor, Osmania University, India
Moonis Raza, Vice Chancellor Emeritus, University of New Delhi, India
Pavel D. Sarkisov, Rector, D.I. Mendeleyev University of Chemical Technology, Russia
Stuart Saunders, Vice Chancellor, University of Cape Town, South Africa
Akilagpa Sawyer, Vice Chancellor, University of Ghana, Ghana
Carlos Vogt, President, Universidade Estadual de Campinas, Brazil
David Ward, Vice Chancellor, University of Wisconsin, Madison, USA
Xide Xie, President Emeritus, Fundan University, People's Republic of China